Is Soy Safe?
Busting the Myths of a Nutritional Powerhouse

By Oscar Rodriguez

STRENGTH FOR AGING BONES

The intimate relationship between osteoporosis, which involves the loss of calcium from aging bones, and atherosclerosis, which involves the deposition of calcium into aging blood vessels, is growing rapidly clearer, and the connection involves the cellular signaling molecules known as inflammatory mediators.57

Since soy products have proven value in reducing markers of inflammation and preventing atherosclerosis, it follows that they should help prevent osteoporosis. For example, soy isoflavones have the ability to interfere with production of the “all-purpose” inflammatory cytokine interleukin-6 (IL-6).58 IL-6 levels rise with advancing age, particularly after menopause and andropause, corresponding to a drop in sex hormone levels. This rise in IL-6 is associated with many of the chronic conditions of aging, including osteoporosis.58

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By blocking IL-6 production, along with numerous other pathways, soy protects against age-related bone loss (resorption).59 Animal studies show that soy extracts and purified genistein act via different mechanisms to modulate gene expression in bone tissue, resulting in beneficial three-dimensional changes in bone structure through reduced activity of multiple inflammatory pathways.60,61

In humans, the effects are no less dramatic. Soy isoflavone supplementation decreases bone resorption in postmenopausal women.62,63 One year of supplementation with soy protein also increased bone formation.64 The combination of enhanced new bone formation and reduced bone resorption may contribute to benefits in preserving bone mineral density, the chief marker of the progress of osteoporosis.65 Notably, this effect is not limited to post-menopausal women: a 2008 study demonstrated a positive change in bone mineral density even in younger women, implying a powerful preventive effect.66

Many of these effects can be traced to the isoflavones’ estrogen-like qualities and are borne out in multiple large epidemiological studies as well as in smaller clinical trials and laboratory research.16 Contrary to fears expressed by some early researchers and vocal critics (See SIDEBAR), soy isoflavones do not produce breast tissue changes or modify breast density on mammography. In fact, they may actually help reduce fibrocystic disease of the breast.67,68

THE SOY “CONTROVERSY”: SEPARATING MYTH FROM FACT

A relatively small group of outspoken critics have fueled the debate over the safety of soy products, many of whom have links to industries threatened by soy’s widespread acceptance.3 Here in a nutshell are their specious claims—and why they don’t hold up:

“Soybeans contain ‘anti-nutrients.’” In raw, unprocessed form, this is true of soybeans. In fact all raw, unprocessed beans contain a variety of enzymes and other biomolecules that can interfere with digestion and absorption of other nutrients. Soybeans are no different. Growers and processors are acutely aware of this as they develop the most nutritional cultivars of this universal food source.104-108 The way around the “problem” of anti-nutrients is simple: don’t eat raw soybeans, and be sure to eat a diet with varied sources of protein (good common sense). In fact, soy protein has been used successfully in treating mild and moderate protein-energy malnutrition in some of the world’s sickest children.109

“Soybeans cause thyroid dysfunction.” Based on a 1960 article describing the occurrence of goiter (thyroid swelling) in a single infant on a pure soy diet, soy opponents extrapolated—and exaggerated—this risk to the entire population.3,110
isoflavones may adversely affect human development, reproduction, or endocrine function."

“Soy causes cancer.” Again, the effects of isoflavones on hormonal function are clear. It made scientific sense early on to raise the question of whether they might adversely affect hormone-dependent cancers. A handful of studies from the mid-1990s showed cellular changes of the kind that can precede cancer—though none showed an actual increase or production of new cancers. Since then, the discovery of ER-beta estrogen receptors, their cancer-inhibiting effects, and the preferential influence of isoflavones on these receptors—in addition to extensive human epidemiological and clinical studies—provide an extremely favorable profile for soy isoflavones with regard to cancer.

SOY PROTEIN AND ISOFLAVONES: POTENT CANCER PREVENTION

Despite the early and isolated concerns regarding a possible link between soy products and cancer, there is now strong evidence that soy provides powerful cancer prevention. Isoflavones’ powerful multitargeted modes of action operate across numerous pathways to fight cancer on multiple fronts simultaneously. This allows reduction in cancer risk at every phase of its progression. Favorable modulation of gene expression is especially important in achieving this comprehensive effect. Exciting recent work shows that equol, the intestinal metabolite of soy isoflavones, has potent anti-cancer effects as well.

Breast Cancer

Early studies from Japan showed that frequent consumption of soy-based miso soup and isoflavones was associated with a reduced risk of breast cancer. A recent prospective study in 5,042 female breast cancer survivors in China, who were followed for a median of 3.9 years, found that consumption of isoflavone-rich soy foods was significantly associated with a 29% lower risk of death and a 32% lower risk of cancer recurrence. Additional evidence from epidemiological, animal, cell culture, and human studies has accumulated showing that isoflavones are promising agents for breast cancer chemoprevention. Daidzein, a soy isoflavone, adds protective effect to the chemotherapy agent tamoxifen in animal studies of mammary cancer. Some of this effect may be explained by soy protein’s ability to alter signaling pathways involving the hormone receptors, and some by its ability to inhibit cell growth. Genistein is unique among flavonoids of interest in cancer prevention in that it has both potent estrogen-like and growth inhibitory effects on breast cancer cells.

Increased isoflavone intake also directly influences sex hormone concentrations and menstrual cycle length in women, effects with the potential for reducing breast cancer risk. And recent exciting work demonstrates that genistein interacts directly with the notorious HER2 cancer-causing gene, inhibiting its activation by cellular machinery and preventing cancer promotion.

Prostate Cancer

Prostate cancer, like breast and uterine cancer, may be stimulated or worsened by sex hormones. Soy isoflavones, with their partial stimulatory/partial inhibitory effects, act by multiple pathways to reduce prostate cancer risk. Genistein from soy reduces signaling between early prostate cancer cells and helps prevent their progression. Genistein sensitizes cancer cells to apoptosis induced by chemotherapy drugs, and blocks activation of NF-kappaB, which is responsible for the connection between inflammation and cancer development. Related studies show that isoflavone supplementation may decrease prostate cancer risk both by reducing NF-kappaB activation and by decreasing levels of damaged DNA strands, an early step in cancer development. Several soy protein components protect against chemically-induced prostate cancer in rats, and isoflavones specifically inhibit synthesis of inflammatory prostaglandins in human prostate cancer cells and in living patients.

An entirely different mechanism of genistein in prostate cancer is the downregulation of sex hormone receptors in prostate tissue, making the cells less responsive to stimulation and cancerous growth. Other cellular signaling systems are also disrupted by genistein, further reducing cancer risk. And in men already diagnosed with prostate cancer, high-dose soy supplements produced an overall decrease in the tumor marker...
prostate-specific antigen (PSA), which rose alarmingly in control patients.84 Similarly, genistein alone is known to arrest the cell cycle and induce cell death by apoptosis, as well as preventing metastatic spread of already-established prostate cancers.84

Colon Cancer

Soy derivatives reduce aberrant crypt foci, the early abnormal changes in intestinal lining cells that may herald the onset of colon cancer.95 And the combination of genistein with indole-3-carbinol, derived from cruciferous vegetables, dramatically enhanced cell death by apoptosis in human colon cancer cells.96 A prospective study published in 2009 demonstrated that consumption of soy foods may reduce the risk of colorectal cancer in postmenopausal women.97

As with the other cancers, colon cancer prevention by soy is accomplished through multiple pathways. Genistein, for example, inhibits intercellular signaling by insulin-like growth factor-1 (IGF-1), with the end result of blocking cancer cell proliferation and inducing apoptosis.98

SLOWING MENOPAUSE WITH SOY

Menopause produces a host of changes in a woman’s body as her natural estrogen levels subside—changes that may be, at least to some extent, more safely slowed by soy isoflavones than estrogen replacement therapy. The decline in cardiovascular function that has its onset at menopause is one such change. Soy protein and isoflavones exert favorable effects on endothelial function in postmenopausal women.99 A low-glycemic index diet fortified with soy protein and phytosterols has been shown to reduce total and LDL cholesterol and triglycerides, and improve HDL ratios, while tending to normalize blood pressure, in a group of postmenopausal women.100 A similar study showed that six months of supplementation with soy protein plus isoflavones produced modest favorable effects on body composition in postmenopausal women.101 And many of the uncomfortable physical effects of menopause, such as hot flushes, respond well to daily doses of isoflavones, particularly genistein.102

Body composition changes after menopause include increase in fat below the skin and in the abdomen, as the normal effects of estrogen fade. These changes were prevented by a daily soy protein supplement over a three-month period in a group of postmenopausal women.100 A similar study showed that six months of supplementation with soy protein plus isoflavones produced modest favorable effects on body composition in postmenopausal women.101 And many of the uncomfortable physical effects of menopause, such as hot flushes, respond well to daily doses of isoflavones, particularly genistein.102

SUMMARY

Soy derivatives, particularly soy proteins and the isoflavones, exert powerfully beneficial effects across multiple systems of the body. Despite popular misconception at the hands of a vocal group of detractors, soy protein’s action on estrogen receptors gives them unique capabilities not found in drugs or other natural compounds. By preferentially acting upon estrogen receptors associated with cancer suppression, soy isoflavones can reduce cancer risk. Soy isoflavones demonstrate remarkable abilities to improve cardiovascular function through multiple pathways in cardiac tissue and in blood vessel linings. Soy proteins and isoflavones also act as powerful antioxidants103 that modulate cellular function through control of gene expression and cell signaling pathways. These effects in turn allow them to help quench inflammatory stimuli that both contribute to and result from modern scourges such as obesity, type 2 diabetes, and metabolic syndrome.

If you have any questions on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

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