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In Good Health:

Soy vey: (from top): Soybean seedlings; sushi with soy sauce; soybean storage and processing in Manchuko (a puppet state set up by Japan in Manchuria, China in the 1930s); stewed tofu and potatoes in miso with broccoli. Photos from Jupter Images (Manchuko soybean processing photo by Julien Hequembourig Bryan).

The Joy—or Oy—of Soy? | Soy is found in everything from hot dogs to baby formula, but is it as healthy as Americans might think? |*By Noelle Robbins*

Health experts and celebrity physicians say it eases everything from menopause to heart disease, boosts protein consumption and reduces fat consumption. Even Oprah Winfrey drinks it up and gulps it down. It is soy. And it is everywhere in the American diet—in soy products and hidden in processed foods. But should it be? Is all soy, all the time, all that good for us?

Just how did soy come to be so ubiquitous in our nutrition scheme? What is soy's history and chemical rap sheet? What role should soy foods play in our lives?

We credit Asia as the source of soy in the diet. Originally, however, soy in China was a fertilizer. The Chinese used it as a plant-based manure and referred to it as "the golden jewel." Soy entered the Asian diet after the Chinese learned to ferment the beans into miso, tamari sauce and tofu, during the Chou Dynasty (1134-246 BC). Yet none of these soy foods was, or is, a major element of the Asian diet. Fish (65 percent in Japan), chicken and pork (65 percent in China) constitute primary sources of protein. Miso, tamari, and tempeh (also fermented) are used as condiments—like ketchup and mustard in the American diet—not the center of the meal, but rather a sassy spark of flavor. Populations in Japan, China, Korea, Taiwan and Indonesia consume only 9 to 36 grams of soy-based foods per day (the equivalent of two teaspoons).

Fermented soy products can add important nutrients to the diet. Miso paste, used as a soup base, includes trace minerals like zinc, manganese and copper, which help strengthen the immune system and protect bones; and, because miso is rich in protein, it can be an energy booster. Natto, a stringy, sticky soybean product with a cheesy smell and nutty flavor, typically eaten with rice, is a popular breakfast food in Japan. It's a good source of protein, Vitamin B2 and Vitamin K2 (which helps head off osteoporosis), as well as selenium, which may help prevent cancer. Tempeh is loaded with fiber, easy to digest and lower in sodium than miso. Tamari sauce, with its deep brown pigment, offers high concentrations of antioxidants, and may enhance digestion of grains and vegetables.

So far, soy good. Fermented soy, eaten in Asia from birth on, plays a small role in what makes the Asian diet and lifestyle so healthy. Fish, rice, vegetables, exercise and stress reduction all contribute to what we have come to view as the secret to Asian longevity.

So how, you might wonder, did soymilk, soy burgers, soy protein shakes, soy hot dogs and soy extracts in so many processed foods achieve such cult status as "the key" to virtual immortality in this country?

Soybean agriculture in America has exploded since the early 1900s. In the 1920s, almost two million acres of soybeans were harvested and by the mid-1950s, almost 20 million acres. Current harvest is more than 70 million acres, making soybeans our third largest crop. USDA figures indicate we are the world's leading soybean producer and exporter.

But—and this is a big but—most of these beans are not for human consumption. They are manufactured into animal feed. Beans are also processed into oil, spreads, butter substitutes and shortening.

As any good industrial spokesperson will tell you, manufacturing results in by-products. And the soy industry in America has diligently developed many ways to use these by-products—which is how soymilk, cheese, yogurt, hot dogs, flour and even baby formula have found their way to our grocery shelves. Waste not, want not, right? Maybe, except these soy products are not fermented, and that makes a big difference in how our bodies respond to the nutrients, and more importantly, the "antinutrients," in soybeans.

Kaayla Daniel, author of *The Whole Soy Story: The Dark Side of America's Favorite Health Food* says, "All

soybeans contain natural antinutrients and toxins. Key antinutrients include: protease inhibitors which interfere with protein digestion; phytates which block mineral absorption; lectins and saponins which have been linked to 'leaky gut' and other gastrointestinal problems; and oxalates which can promote kidney stones." Although all beans contain these same antinutrients, "soybeans contain many more of them," she says. Which brings us back to how processing affects soybean benefits, and safety.

Fermentation—soaking soybeans in a mold starter, to which a brine and yeast solution is added, followed by an aging process—produces miso, natto and tempeh, and removes, or detoxifies, most antinutrients. Slow and natural, like yogurt and wine. Tofu, a by-product of fermentation using a puree of cooked soybeans precipitated with magnesium or calcium sulfate, contains a higher level of antinutrients.

High-tech manufacturing, which creates the soy-based products, protein isolates and isoflavones filling our shopping carts, is neither slow, nor natural. Modern processing methods focus on speed, volume and cost. In industrial factories, soy slurry is bathed with alkaline solution that removes fiber. Next comes high temperatures and pressures, acid and alkali baths, and hexane solvents. Mix well in aluminum tanks which leach into the soy protein and you have production methods "that not only fail to eliminate antinutri-ents and toxins, but can leave

carcinogenic residue," says Daniel.

Despite the dubious health benefits of unfermented soy, and the possible health risks inherent in modern soy manufacturing, the soy industry has ingeniously implemented a two-pronged approach to reach consumers: Developing new ways to package its by-products while effectively attempting to identify and exploit, any possible health upside of soy consumption—while, of course, downplaying the downside.

As a result, soy is touted as the cure for hot flashes, heart disease and bone loss. It is acclaimed for its low-fat, high-protein content. And it is everywhere—not just in products labeled soy, but in many other processed foods, as well.

Among the most commonly consumed manufactured soy products in the United States are soymilk and soy infant formula. Soymilk has been embraced enthusiastically by a growing segment of our population—peri-menopausal and menopausal women. Persistent accounts of the absence of menopausal woes experienced by Asian women have helped boost soymilk's popularity among substantial numbers of women in this country.

Lani Simpson, an East Bay chiropractor specializing in women's health, conducts "The Heat Is On" seminars for health professionals and the lay public. She has some big reservations about relying on soymilk to ease the symptoms of menopause because, she says, the soymilk downed by the glassful in this country is not the same product as soymilk in Asia. "Japanese soymilk is definitely different; it is fresh and goes bad in a short amount of time. Soymilk in the U.S. has a very long shelf life—it takes forever to spoil," she says. In addition, just eight ounces of soymilk contains up to 240 grams of soy (remember Asian consumption is less than 40 grams per day).

What about the wonderful estrogenic effects of soymilk for women suffering from hot flashes?

The American Heart Association (AHA), in the course of developing recommendations regarding soy as a preventive food for heart disease, found no support for the belief that soy protein and isoflavones reduce hot flashes during menopause. Their studies also revealed no evidence that soy isoflavones prevent or treat reproductive and breast cancers. And, according to the Circulation Journal of the AHA, soy is no longer promoted as beneficial in cutting cardiovascular risk factors. In fact, a scientific statement issued in January 2006 says, "the AHA found no benefit for soy protein or isoflavones in lowering LDL cholesterol, improving HDL, or lowering blood pressure."

Might we see greater benefit if we all started soy consumption earlier in life, say in soy baby formula? Don't

bet on it. Because approximately 25 percent of North American babies drink formula made from processed soybeans, it is important to review some facts: Antinutrients in soy hinder the action of trypsin, an enzyme needed for effective protein digestion. Phytic acid in soybeans and soy formula, inhibits the absorption of essential minerals such as magnesium, iron, calcium and zinc, all indispensable building blocks for baby's healthy development. And there is rising concern that phytoestrogens (isoflavones) negatively affect growing babies and children.

In an academic paper, *The Case for Expanded Phytoestrogen Research*, Daniel Sheehan, from the FDA National Center for Toxicological Research, asserts, "Soy-fed babies are taking part in a large, uncontrolled, and basically unmonitored human infant experiment." It is estimated that a soy-fed baby may be receiving the equivalent of five birth control pills worth of estrogen per day.

In 1998, the U.S. Environmental Protection Agency's Endocrine Disruptors Screening and Testing Advisory Committee established the phytoestrogen content in soy formula as one of six topics requiring priority research.

Although other sources of estrogen in the diet and environment, may be contributing factors, there is growing alarm regarding the early maturation of girls and reproductive problems in boys. The lack of cholesterol in soy can actually damage a growing infant because a baby depends on fat for development of the brain and nervous system, and for absorption of adequate levels of Vitamin D. Allergic reactions to soy are on the rise, possibly due to early introduction of processed soy.

Mary Shomon, author of *Living Well With Hypothyroidism: What Your Doctor Doesn't Tell You*, reports that researchers have associated high soy consumption with inhibition of normal thyroid function. This is because soy isoflavones act as potent anti-thyroid agents that can cause or worsen hypothyroidism. Oprah, whose own recipe for chocolate strawberry smoothie relies on soymilk, has recently reported a "blow out" of her thyroid. Hmmm.

Which brings us back to celebrity physician endorsement of soy consumption. Dr. Christiane Northrup, author of *The Wisdom of Menopause,* offers a spirited defense of soy products, including soy formula, in her book and on her Web site. She used soy formula to supplement her breast milk when nursing her own children.

Dr. Mehmet Oz, author of *You on a Diet,* is affiliated with the Web site *RealAge.Inc.* which is more circumspect in its discussion of soy consumption, asserting, "Much of the publicity surrounding the soybean has been generated by makers of soy products, so it is difficult to separate hype from reality." On the site, Oz and co-author Dr. Michael Roizin describe whole-soybean foods, as opposed to added soy proteins, as "very healthy additions to a diverse diet."

When it comes to soy in the diet, consider Dr. Simpson's recommendation: "Not daily, not processed. Moderation is key. People need to remember that food is a powerful drug." RealAge advises, "As a general rule, try not to stray too far from the whole soybeans . . . Always opt for foods made from whole soybeans rather than added soy protein or soy isolates."

And following the Asian model, aim for fermented soy foods. Check the labels because soy additives, protein isolates and isoflavones are prevalent in many processed foods. Manufactured soy is fast on the way to becoming the new high-fructose corn syrup—in everything, but not necessarily good for anyone. There is no such thing as one perfect food, one magic key to unlock the door of a long healthy life; and, in the case of soy, joy can turn to oy—when there is too much of a good thing.

Skinny on Soy

People
Lani Simpson, D.C., "The Heat is On" seminars and private consultation in Berkeley, (510) 898-0933;

www.lanisimpson.com.

Books
Kaayla T. Daniel, *The Whole Soy Story* (New Trends Publishing, 2005); www.wholesoystory.com or wholenutritionist@earthlink.net.
Mary Shomon, *Living Well With Hypothyroidism: What Your Doctor Doesn't Tell You* (HarperCollins, 2000); www.thyroid.about.com or www.thyroid-info.com.

Web sites
American Heart Association: www.ahajournals.org. See "Soy: The Way to a Woman's Heart Is Through the Stomach"
American Soybean Association: www.soyproducers.com.
Archives of Internal Medicine: www.archinte.ama-assn.org.
Christiane Northrup, M.D.: www.drnorthrup.com. See "Women's Health: Health Conditions & Advice"
MedPage Today: www.medpagetoday.com. See "Heart Association Ardor Cools for Soy Protein"
Joseph Mercola, M.D.: www.mercola.com. See "Soy: Too Good to Be True"
Mehmet Oz, M.D.: www.realage.com. See "Soy: Finally Separating Hype from Reality"
Weston A. Price Foundation: www.westonprice.org. See "Soy Infant Formula—Better Than Breastmilk?"
Note: Many Web sites touting benefits of soy contain research dated 2000 or earlier and/or are run by soy producers.

Noelle Robbins is a freelance writer specializing in individual, family and community/environmental health issues.