

Overview of the Nutritional and Health Attributes of Soy

By Mark Messina, PhD

References

1. Messina M, Nagata C, Wu AH. Estimated Asian adult soy protein and isoflavone intakes. **Nutr Cancer**. 2006;55(1):1-12.
2. Messina MJ. Legumes and soybeans: overview of their nutritional profiles and health effects. **Am J Clin Nutr**. 1999;70(3 Suppl):439S-450S.
3. Hughes GJ, Ryan DJ, Mukherjea R, Schasteen CS. Protein digestibility-corrected amino acid scores (PDCAAS) for soy protein isolates and concentrate: criteria for evaluation. **J Agric Food Chem**. 2011;59(23):12707-12712.
4. Food labeling: health claims; soy protein and coronary heart disease. Food and Drug Administration, HHS. Final rule. **Fed Regist**. 1999;64(206):57700-57733.
5. Xiao CW. Health effects of soy protein and isoflavones in humans. **J Nutr**. 2008;138(6):1244S-1249S.
6. Benkhedda KB, Boudrault C, Sinclair SE, Marles RJ, Xiao CW, Underhill L. Food risk analysis communication. Issued by Health Canada's Food Directorate. Health Canada's proposal to accept a health claim about soy products and cholesterol lowering. **Int Food Risk Anal J**. 2014;4:22.
7. Anderson JW, Bush HM. Soy protein effects on serum lipoproteins: a quality assessment and meta-analysis of randomized, controlled studies. **J Am Coll Nutr**. 2011;30(2):79-91.
8. Jenkins DJ, Mirrahimi A, Srichaikul K, et al. Soy protein reduces serum cholesterol by both intrinsic and food displacement mechanisms. **J Nutr**. 2010;140(12):2302S-2311S.
9. Harland JI, Haffner TA. Systematic review, meta-analysis and regression of randomised controlled trials reporting an association between an intake of circa 25 g soya protein per day and blood cholesterol. **Atherosclerosis**. 2008;200(1):13-27.
10. Reynolds K, Chin A, Lees KA, Nguyen A, Bujnowski D, He J. A meta-analysis of the effect of soy protein supplementation on serum lipids. **Am J Cardiol**. 2006;98(5):633-640.
11. Zhan S, Ho SC. Meta-analysis of the effects of soy protein containing isoflavones on the lipid profile. **Am J Clin Nutr**. 2005;81(2):397-408.
12. Padhi EM, Blewett HJ, Duncan AM, et al. Whole soy flour incorporated into a muffin and consumed at 2 doses of soy protein does not lower LDL cholesterol in a randomized, double-blind controlled trial of hypercholesterolemic adults. **J Nutr**. 2015;145(12):2665-2674.

Overview of the Nutritional and Health Attributes of Soy

By Mark Messina, PhD

13. US Food and Drug Administration. FDA statement regarding soy protein and coronary heart disease health claim review.
<http://www.fda.gov/food/ingredientspackaginglabeling/labelingnutrition/ucm509239.htm>.
Published June 30, 2016.
14. Jenkins DJ, Kendall CW, Faulkner D, et al. A dietary portfolio approach to cholesterol reduction: combined effects of plant sterols, vegetable proteins, and viscous fibers in hypercholesterolemia. *Metabolism*. 2002;51(12):1596-1604.
15. Hooper L, Kroon PA, Rimm EB, et al. Flavonoids, flavonoid-rich foods, and cardiovascular risk: a meta-analysis of randomized controlled trials. *Am J Clin Nutr*. 2008;88(1):38-50.
16. Dong JY, Tong X, Wu ZW, Xun PC, He K, Qin LQ. Effect of soya protein on blood pressure: a meta-analysis of randomised controlled trials. *Br J Nutr*. 2011;106(3):317-326.
17. Taku K, Lin N, Cai D, et al. Effects of soy isoflavone extract supplements on blood pressure in adult humans: systematic review and meta-analysis of randomized placebo-controlled trials. *J Hypertens*. 2010;28(10):1971-1982.
18. Liu XX, Li SH, Chen JZ, et al. Effect of soy isoflavones on blood pressure: a meta-analysis of randomized controlled trials. *Nutr Metab Cardiovasc Dis*. 2012;22(6):463-470.
19. McGraw NJ, Krul ES, Grunz-Borgmann E, Parrish AR. Soy-based renoprotection. *World J Nephrol*. 2016;5(3):233-257.
20. Blasbalg TL, Hibbeln JR, Ramsden CE, Majchrzak SF, Rawlings RR. Changes in consumption of omega-3 and omega-6 fatty acids in the United States during the 20th century. *Am J Clin Nutr*. 2011;93(5):950-962.
21. Wu Z, Rodgers RP, Marshall AG. Characterization of vegetable oils: detailed compositional fingerprints derived from electrospray ionization fourier transform ion cyclotron resonance mass spectrometry. *J Agric Food Chem*. 2004;52(17):5322-5328.
22. Slavin M, Kenworthy W, Yu LL. Antioxidant properties, phytochemical composition, and antiproliferative activity of Maryland-grown soybeans with colored seed coats. *J Agric Food Chem*. 2009;57(23):11174-11185.
23. Li Y, Hruby A, Bernstein AM, et al. Saturated fats compared with unsaturated fats and sources of carbohydrates in relation to risk of coronary heart disease: a prospective cohort study. *J Am Coll Cardiol*. 2015;66(14):1538-1548.

Overview of the Nutritional and Health Attributes of Soy

By Mark Messina, PhD

24. Wang DD, Li Y, Chiuve SE, et al. Association of specific dietary fats with total and cause-specific mortality. *JAMA Intern Med.* 2016;176(8):1134-1145.
25. Bai W, Wang C, Ren C. Intakes of total and individual flavonoids by US adults. *Int J Food Sci Nutr.* 2014;65(1):9-20.
26. Messina M, Nagata C, Wu AH. Estimated Asian adult soy protein and isoflavone intakes. *Nutr Cancer.* 2006;55(1):1-12.
27. Ostblom E, Lilja G, Ahlstedt S, van Hage M, Wickman M. Patterns of quantitative food-specific IgE-antibodies and reported food hypersensitivity in 4-year-old children. *Allergy.* 2008;63(4):418-424.
28. Pisani P, Bray F, Parkin DM. Estimates of the world-wide prevalence of cancer for 25 sites in the adult population. *Int J Cancer.* 2002;97(1):72-81.
29. Minami Y, Tsubono Y, Nishino Y, Ohuchi N, Shibuya D, Hisamichi S. The increase of female breast cancer incidence in Japan: emergence of birth cohort effect. *Int J Cancer.* 2004;108(6):901-906.
30. Xie Q, Chen ML, Qin Y, et al. Isoflavone consumption and risk of breast cancer: a dose-response meta-analysis of observational studies. *Asia Pac J Clin Nutr.* 2013;22(1): 118-127.
31. Shu XO, Jin F, Dai Q, et al. Soyfood intake during adolescence and subsequent risk of breast cancer among Chinese women. *Cancer Epidemiol Biomarkers Prev.* 2001;10(5):483-488.
32. Wu AH, Yu MC, Tseng CC, Stanczyk FZ, Pike MC. Dietary patterns and breast cancer risk in Asian American women. *Am J Clin Nutr.* 2009;89(4):1145-1154.
33. Korde LA, Wu AH, Fears T, et al. Childhood soy intake and breast cancer risk in Asian American women. *Cancer Epidemiol Biomarkers Prev.* 2009;18(4):1050-1059.
34. Baglia ML, Gu K, Zhang X, et al. Soy isoflavone intake and bone mineral density in breast cancer survivors. *Cancer Causes Control.* 2015;26(4):571-580.
35. Moyer VA. Menopausal hormone therapy for the primary prevention of chronic conditions: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2013;158(1):47-54.
36. Manson JE, Chlebowski RT, Stefanick ML, et al. Menopausal hormone therapy and health outcomes during the intervention and extended poststopping phases of the Women's Health Initiative randomized trials. *JAMA.* 2013;310(13):1353-1368.

Overview of the Nutritional and Health Attributes of Soy

By Mark Messina, PhD

37. Messina M, Caan BJ, Abrams DI, Hardy M, Maskarinec G. It's time for clinicians to reconsider their proscription against the use of soyfoods by breast cancer patients. **Oncology**. 2013;27(5):430-437.
38. Conner P, Soderqvist G, Skoog L, et al. Breast cell proliferation in postmenopausal women during HRT evaluated through fine needle aspiration cytology. **Breast Cancer Res Treat**. 2003;78(2):159-165.
39. Murkes D, Conner P, Leifland K, et al. Effects of percutaneous estradiol-oral progesterone versus oral conjugated equine estrogens-medroxyprogesterone acetate on breast cell proliferation and bcl-2 protein in healthy women. **Fertil Steril**. 2011;95(3):1188-1191.
40. Rock CL, Doyle C, Demark-Wahnefried W, et al. Nutrition and physical activity guidelines for cancer survivors. **CA Cancer J Clin**. 2012;62(4):242-274.
41. Soy is safe for breast cancer survivors. American Institute for Cancer Research website. http://www.aicr.org/cancer-research-update/2012/november_21_2012/cru-soy-safe.html?referrer=https://www.google.com/. Published November 21, 2012. Accessed February 5, 2013.
42. EFSA Panel on Food Additives and Nutrient Sources added to Food. Risk assessment for peri- and post-menopausal women taking food supplements containing isolated isoflavones. **EFSA J**. 2015;13(10):4246.
43. Diet, nutrition, physical activity and liver cancer. World Cancer Research Fund International website. www.wcrf.org/sites/default/files/Liver-Cancer-2015-Report.pdf. Published 2015.
44. Chi F, Wu R, Zeng YC, Xing R, Liu Y, Xu ZG. Post-diagnosis soy food intake and breast cancer survival: a meta-analysis of cohort studies. **Asian Pac J Cancer Prev**. 2013;14(4):2407-2412.
45. Eakin A, Kelsberg G, Safranek S. Clinical Inquiry: does high dietary soy intake affect a woman's risk of primary or recurrent breast cancer? **J Fam Pract**. 2015;64(10):660-662.
46. Adlercreutz H, Hamalainen E, Gorbach S, Goldin B. Dietary phyto-oestrogens and the menopause in Japan. **Lancet**. 1992;339(8803):1233.
47. Taku K, Melby MK, Kronenberg F, Kurzer MS, Messina M. Extracted or synthesized soybean isoflavones reduce menopausal hot flash frequency and severity: systematic review and meta-analysis of randomized controlled trials. **Menopause**. 2012;19(7):776-790.

Overview of the Nutritional and Health Attributes of Soy

By Mark Messina, PhD

48. Li L, Xu L, Wu J, Dong L, Zhao S, Zheng Q. Comparative efficacy of nonhormonal drugs on menopausal hot flashes. *Eur J Clin Pharmacol*. 2016;72(9):1051-1058.
49. Pawlowski JW, Martin BR, McCabe GP, et al. Impact of equol-producing capacity and soy-isoflavone profiles of supplements on bone calcium retention in postmenopausal women: a randomized crossover trial. *Am J Clin Nutr*. 2015;102(3):695-703.
50. Siepmann T, Roofeh J, Kiefer FW, Edelson DG. Hypogonadism and erectile dysfunction associated with soy product consumption. *Nutrition*. 2011;27(7-8):859-862.
51. Martinez J, Lewi JE. An unusual case of gynecomastia associated with soy product consumption. *Endocr Pract*. 2008;14(4):415-418.
52. Hamilton-Reeves JM, Vazquez G, Duval SJ, Phipps WR, Kurzer MS, Messina MJ. Clinical studies show no effects of soy protein or isoflavones on reproductive hormones in men: results of a meta-analysis. *Fertil Steril*. 2010;94(3):997-1007.
53. Messina M. Soybean isoflavone exposure does not have feminizing effects on men: a critical examination of the clinical evidence. *Fertil Steril*. 2010;93(7):2095-2104.
54. Yan L, Spitznagel EL. Soy consumption and prostate cancer risk in men: a revisit of a meta-analysis. *Am J Clin Nutr*. 2009;89(4):1155-1163.
55. Zhang M, Wang K, Chen L, Yin B, Song Y. Is phytoestrogen intake associated with decreased risk of prostate cancer? A systematic review of epidemiological studies based on 17,546 cases. *Andrology*. 2016;4(4):745-756.
56. Messina M, Redmond G. Effects of soy protein and soybean isoflavones on thyroid function in healthy adults and hypothyroid patients: a review of the relevant literature. *Thyroid*. 2006;16(3):249-258.
57. Bitto A, Polito F, Atteritano M, et al. Genistein aglycone does not affect thyroid function: results from a three-year, randomized, double-blind, placebo-controlled trial. *J Clin Endocrinol Metab*. 2010;95(6):3067-3072.
58. Liwanpo L, Hershman JM. Conditions and drugs interfering with thyroxine absorption. *Best Pract Res Clin Endocrinol Metab*. 2009;23(6):781-792.
59. Zeitler P, Solberg P. Food and levothyroxine administration in infants and children. *J Pediatr*. 2010;157(1):13-14.
60. Zhao Y, Martin BR, Weaver CM. Calcium bioavailability of calcium carbonate fortified soymilk is equivalent to cow's milk in young women. *J Nutr*. 2005;135(10):2379-2382.

Overview of the Nutritional and Health Attributes of Soy

By Mark Messina, PhD

61. Weaver CM, Heaney RP, Connor L, Martin BR, Smith DL, Nielsen E. Bioavailability of calcium from tofu vs. milk in premenopausal women. **J Food Sci.** 2002;68:3144-3147.
62. Murray-Kolb LE, Welch R, Theil EC, Beard JL. Women with low iron stores absorb iron from soybeans. **Am J Clin Nutr.** 2003;77(1):180-184.
63. Lonnerdal B, Bryant A, Liu X, Theil EC. Iron absorption from soybean ferritin in nonanemic women. **Am J Clin Nutr.** 2006;83(1):103-107.
64. Armah SM, Boy E, Chen D, Candal P, Reddy MB. Regular consumption of a high-phytate diet reduces the inhibitory effect of phytate on nonheme-iron absorption in women with suboptimal iron stores. **J Nutr.** 2015;145(8):1735-1739.
65. Schoeters G, Den Hond E, Dhooge W, van Larebeke N, Leijs M. Endocrine disruptors and abnormalities of pubertal development. **Basic Clin Pharmacol Toxicol.** 2008;102(2):168-175.
66. Junqueira Do Lago M, Faerstein E, De Souza Lopes C, Werneck GL. Family socioeconomic background modified secular trends in age at menarche: evidence from the Pro-Saude Study (Rio de Janeiro, Brazil). **Ann Hum Biol.** 2003;30(3):347-352.
67. Harris MA, Prior JC, Koehoorn M. Age at menarche in the Canadian population: secular trends and relationship to adulthood BMI. **J Adolesc Health.** 2008;43(6):548-554.
68. Hosokawa M, Imazeki S, Mizunuma H, Kubota T, Hayashi K. Secular trends in age at menarche and time to establish regular menstrual cycling in Japanese women born between 1930 and 1985. **BMC Womens Health.** 2012;12:19.
69. Cho GJ, Park HT, Shin JH, et al. Age at menarche in a Korean population: secular trends and influencing factors. **Eur J Pediatr.** 2010;169(1):89-94.
70. Morris DH, Jones ME, Schoemaker MJ, Ashworth A, Swerdlow AJ. Secular trends in age at menarche in women in the UK born 1908-93: results from the Breakthrough Generations Study. **Paediatr Perinat Epidemiol.** 2011;25(4):394-400.
71. Cabanes A, Ascunce N, Vidal E, et al. Decline in age at menarche among Spanish women born from 1925 to 1962. **BMC Public Health.** 2009;9:449.
72. Herman-Giddens ME. Recent data on pubertal milestones in United States children: the secular trend toward earlier development. **Int J Androl.** 2006;29(1):241-246; discussion 286-290.

Overview of the Nutritional and Health Attributes of Soy

By Mark Messina, PhD

73. Himes JH. Examining the evidence for recent secular changes in the timing of puberty in US children in light of increases in the prevalence of obesity. ***Mol Cell Endocrinol***. 2006;254-255:13-21.
74. Schoeters G, Den Hond E, Dhooge W, van Larebeke N, Leijts M. Endocrine disruptors and abnormalities of pubertal development. ***Basic Clin Pharmacol Toxicol***. 2008;102(2):168-175.
75. Segovia-Siapco G, Pribis P, Messina M, Oda K, Sabate J. Is soy intake related to age at onset of menarche? A cross-sectional study among adolescents with a wide range of soy food consumption. ***Nutr J***. 2014;13(1):54.
76. Vierk KA, Koehler KM, Fein SB, Street DA. Prevalence of self-reported food allergy in American adults and use of food labels. ***J Allergy Clin Immunol***. 2007;119(6):1504-1510.
77. Gupta RS, Springston EE, Warrier MR, et al. The prevalence, severity, and distribution of childhood food allergy in the United States. ***Pediatrics***. 2011;128(1):e9-e17.