

## Phytoestrogens in Diets of Infants and Adults

Children receiving soy formula as their only food take in over 10 times the levels of isoflavones on a body weight basis than the amount shown to cause thyroid suppression in adults after three months and about eight times the levels of isoflavones on a bodyweight basis as the amount shown to cause hormonal changes in adults after just one month.

	Average Isoflavones Intake	Isoflavone per Kg of body weight*
China (1990 survey) <sup>1</sup>	3 mg	0.05 mg
Japan (1996 survey) <sup>2</sup>	10 mg	0.17 mg
Japan (1998 survey) <sup>3</sup>	25 mg	0.42 mg
Japan (2000 survey) <sup>4</sup>	28 mg	0.47 mg
In Japanese subjects receiving adequate iodine causing thyroid suppression after 3 months <sup>5</sup>	35 mg	0.58 mg
In American women, causing hormonal changes after 1 month <sup>6</sup>	45 mg	0.75 mg
FDA recommended amount for adults <sup>7</sup>	24 mg	0.40 mg
In children receiving soy formula <sup>8</sup>	38 mg	6.25 mg

\* Assumed 60 kg for adults, 6 kg for infants

It is clear that the isoflavones in soy infant formula are well absorbed by the infant. Babies on soy formula were found to have levels of serum estrogens at 13,000 - 22,000 times greater than those in infants who had been breast fed or given milk-based formula.<sup>9</sup>

According to a Swiss report, 100 mg isoflavones taken by adult women provide the estrogenic equivalent of a contraceptive pill.<sup>10</sup> This means that 10 mg provides the estrogenic equivalent of a contraceptive pill to a baby of 6 kg. Thus, the average amount taken in by a child on soy-based formula provides the estrogenic equivalent of at least 4 birth control pills. Because babies are more vulnerable than adults to the effects of dietary estrogens, the effects could actually be much greater than that of 4 birth control pills. Hence the statement, "Babies on soy formula receive the estrogenic equivalent of at least 5 birth control pills per day."

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- <sup>1</sup> An exhaustive study of Chinese diets found that legume consumption ranged from 0 to 58 grams per day, with an average of 13 grams. According to the researchers, about two-thirds of this was supplied by soy beans, giving average consumption of about 9 grams of soy products per day. Chen J, Campbell TC, Li J, Peto R. *Diet, Lifestyle and Mortality in China. A study of the characteristics of 65 counties*. Monograph, joint publication of Oxford University Press, Cornell University Press, China People's Medical Publishing House, 1990. Isoflavone content is estimated be about 3 mg per day based on an average amount of 30 mg total isoflavones per 100 grams of tofu. *USDA-Iowa State University Database on the Isoflavone Content of Foods 1999*.
- <sup>2</sup> Fukutake M and others. Quantification of genistein and genistin in soybeans and soybean products. *Food Chem Toxicol* 1996;34:457-461.
- <sup>3</sup> Nagata C and others. Decreased serum total cholesterol concentration is associated with high intake of soy products in Japanese men and women. *J Nutr* 1998 Feb;128(2):209-13.
- <sup>4</sup> Nakamura Y and others. Determination of the levels of isoflavonoids in soybeans and soy-derived foods and estimation of isoflavonoids in the Japanese daily intake. *J AOAC Int* 2000;83:635-650.
- <sup>5</sup> Y Ishizuki and others. The effects on the thyroid gland of soybeans administered experimentally in healthy subjects. *Nippon Naibunpi Gakkai Zasshi* 1991, 767: 622-629. Thirty grams of soybeans per day were administered to the test subjects. Raw Japanese soybeans contain 119 mg total isoflavones per 100 grams, giving a rough total of 35 mg isoflavones per day.
- <sup>6</sup> Cassidy A, Bingham S, Setchell KD. Biological effects of a diet of soy protein rich in isoflavones on the menstrual cycle of premenopausal women. *Am J Clin Nutr* 1994;60(3):333-340.
- <sup>7</sup> The FDA recommended amount for adults is 25 grams of soy protein isolate per day. This provides about 24 mg isoflavones per day based on a total isoflavone content of 97 mg for 100 grams of soy protein isolate. *USDA-Iowa State University Database on the Isoflavone Content of Foods 1999*.
- <sup>8</sup> Setchell KD and others. Isoflavone content of infant formulas and the metabolic fate of these early phytoestrogens in early life. *Am J Clin Nutr* 1998 Dec;68(6 Suppl):1453S-1461S.
- <sup>9</sup> *Ibid.*
- <sup>10</sup> *Bulletin de L'Office Federal de la Santé Publique*, No 28, July 20, 1992.