Soy & Women’s Health
Introduction to Soy Isoflavones

Isoflavone Intake in Different Countries

- Soyfoods contain a group of three isoflavones, genistein, daidzein and glycitein with approximately 90% of the total isoflavone content consisting of the first two.\(^1\)
- Mean isoflavone intake among older adults in Japan and Shanghai ranges from about 30 to 50 mg/day.\(^2\)
- Whereas estimated daily isoflavone intake in Hong Kong is approximately 10 mg.\(^3, 4\)
- Importantly, diets that do not include soyfoods are almost devoid of isoflavones.\(^5\) In European countries and the United States (U.S.), isoflavone intake is much lower compared to Asian countries; intake in Ireland, Italy, The Netherlands and the United Kingdom is on average less than 1 mg/day; likewise in the U.S., the estimated intake is on average 1.1 mg/day.\(^6\)

Isoflavones in Soybeans

- Isoflavones occur in soybeans almost exclusively as glycosides with a sugar molecule attached to the isoflavone backbone.\(^1\) In fermented soyfoods such as miso, tempeh and natto, substantial amounts of the isoflavones occur as aglycones due to bacterial hydrolysis. Upon ingestion, the sugar is hydrolyzed, allowing absorption to occur.\(^8\)
- The amount of isoflavones in soybeans and traditional soyfoods is fairly proportionally consistent with the amount of protein. For every gram of protein in these foods, there are approximately 3.5 mg of isoflavones.\(^2\)
- Consequently, one serving of a traditional soyfood, such as 3 to 4 oz. of tofu or 1 cup of soymilk, typically provides about 25 mg of isoflavones.

Important Properties of Isoflavones

- Isoflavones have a chemical structure similar to the hormone estrogen and can bind to both types of estrogen receptor (ER) – ER\(\alpha\) and ER\(\beta\).\(^9, 10\) Although isoflavones are able to exert estrogen-like effects under certain experimental conditions, isoflavones differ from the hormone estrogen in important ways.
- While estrogen binds to and activates both ER\(\alpha\) and ER\(\beta\) equally, isoflavones preferentially bind to and activate ER\(\beta\).\(^11-14\) This distinction is important because the two estrogen receptors have different tissue distributions and, when activated, can have different and sometimes even opposite physiological effects.
- In breast tissue, isoflavones may be protective because ER\(\beta\) activation inhibits the proliferative effects of ER\(\alpha\) activation.\(^15, 16\) Because of the preference of isoflavones for ER\(\beta\), they are classified as selective estrogen receptor modulators (SERMs).\(^17-19\)
- In tissues that possess estrogen receptors, SERMs exert estrogen-like effects in some cases but no effects or anti-estrogenic effects in others. Pharmaceutical examples of SERMs include tamoxifen and raloxifene, both of which are used to treat breast cancer. Raloxifene is also used for treatment of osteoporosis.\(^20\)
- There are many clinical examples showing different effects of isoflavones and estrogen and it is clear that isoflavones cannot be equated with the hormone estrogen.\(^19, 21-41\)
- Moreover, effects of soyfoods are not limited to the effects of isoflavones since soybeans, like all foods, contain hundreds of biologically active molecules.\(^42\)

Conclusion

- Isoflavones are unique compounds which exhibit different effects to estrogen in the body, which help to explain why isoflavones initiate different positive biological effects on human health.
References:


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