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Estrogenic isoflavones as modern food compounds can have both beneficial and adverse effects

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Soy isoflavones: genistein, daidzein and glycitein, can exert estrogen-like activities. Their endocrine disrupting activities were first identified in cattle grazing phytoestrogens-rich pastures. If glycitein is an ERβ agonist, genistein, daidzein and its metabolite equol exhibit significant transcriptional activities through both ERα and ERβ. They can also induce gene transcription through GPR-30 and ERRα, β, γ at dietary doses. *In vivo* and in humans, estrogenic effects can be positive or negative depending on the physiological status and the target tissue. These estrogenic activities having been confirmed in toxicological studies by the US National Toxicology Program (NTP), were analyzed in clinical studies. No individual study is definitely convincing, however, putting all data together shows that estrogenic effects on several targets and on reproduction can be recorded for isoflavone daily intakes ranging from 40 to 60mg in adults (about 0.75 mg/kg/day). These active doses lead to free plasma aglycone levels being 500 to 5000 times higher than free-estradiol in human plasma, depending if children, premenopausal women, men or postmenopausal women are considered. In soy, isoflavones are present as glycosides and are soluble in water. This allows them to leak into water during prolonged cooking or simmering. These cooking steps were common in traditional Asian recipes but are no longer found in modern soy industrial processes which were designed to reduce energy and environmental costs. Therefore, the human exposure to estrogenic isoflavones rose recently with the development of industrial soy-based-foods. Estrogenic isoflavones can therefore be considered as modern endocrine disruptors acting in synergy with other environmental compounds. Removing isoflavones from modern food may be a solution. To take advantages of these substances still lowering their deleterious effects for the global population, their use in dietary-supplements or biological preparations should be studied further. Such preparations should allow targeting the right physiological status.

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