

ESU 009– Isoflavons

Lecture 15



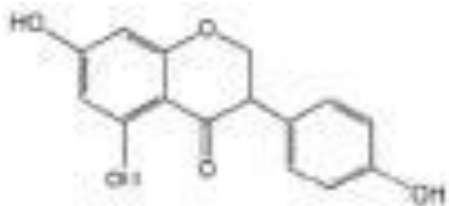
Introduction



- Soy is a low cost source of protein that has been consumed in Asian nations for many centuries
- Regular intake of this food is thought to be partially responsible for the lower rates of heart disease, stroke, and cancer observed in Eastern populations.

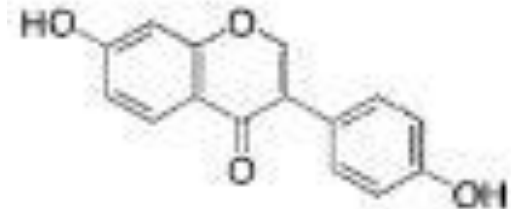
Introduction

- Isoflavones are members of the large flavonoid family of plant compounds which are, in turn, members of the larger group of plant constituents known as polyphenols
- The principal isoflavones in soy are genistein, daidzein, and their metabolites



GENISTEIN (4',5,7-trihydroxyisoflavone)

Genistein



Daidzein

Good sources of Soy...



- Soy beans:

Soy beans are the least processed form of soy protein. They are available in most grocery stores and can be purchased in fresh, frozen, or roasted forms.



- Tofu:

Tofu, or bean curd, is made by curdling soymilk with a coagulant. Tofu can be used in a variety of recipes to partially replace either meat or dairy products. Because calcium sulfate is often used as the curdling agent, tofu is also a good source of calcium.



- Soymilk:

Soymilk is a high-quality source of soy protein that's available in a variety of forms, including chocolate.

Sources...

- Isoflavone compounds, such as genistein and daidzein, are found in a number of plants, but soybeans and soy products like tofu and textured vegetable protein are the primary food sources.



Mechanisms of Action..

- There are many proposed mechanisms for the therapeutic effect of isoflavones
- The mechanisms include:
 - binding to estrogen receptors
 - inhibition of production of reactive oxygen species
 - induction of DNA strand breakage resulting in apoptosis or cell death
 - inhibition of angiogenesis
 - inhibition of thrombin formation and platelet activation

Breast Cancer

- Interest in the relationship between soy intake and cancer risk was due, in large part, to the relatively low breast cancer mortality rates in Asian countries where soy foods are commonly consumed.
- In Japan, the breast cancer mortality rate is about $\frac{1}{4}$ that of the United States.



Prostate Cancer

- There is speculation that the intake of soyfoods may be a factor contributing to the low prostate cancer mortality rate in Japan
- Although the data in support of this hypothesis is intriguing, it is also limiting
- Genistein has shown to inhibit the growth of both androgen-dependent and androgen-independent prostate cancer cells in vitro

Soy and Bone Health

- Speculation about the potential benefits of isoflavones was in part fueled by the similarity in chemical structure between the soybean isoflavones and the synthetic isoflavone, 7-isopropoxyisoflavone, which was shown to increase bone mass in postmenopausal women

Soy & Cardiovascular Health: An Overview

- Dietary soy protein has been shown to have several beneficial effects on cardiovascular health.
- Best-documented effect is on plasma lipid and lipoprotein concentrations, with reductions of ~10% in LDL cholesterol, and small increases in HDL cholesterol.
- Dietary soy protein improves flow-mediated arterial dilation.
- Soy isoflavone extract improves systemic arterial compliance, an indicator of atherosclerosis extent.

Soy & Cardiovascular Health

Plasma lipids and lipoproteins

- Effects of dietary soy protein in human subjects has shown reductions in LDL cholesterol of ~13%, reductions in plasma triglycerides of ~10%, and increases in HDL cholesterol of around 2%
- These beneficial effects of soy protein on plasma lipoproteins culminated recently in the U.S. Food and Drug Administration's approval of the health claim that:
 - “25 g of soy protein a day, as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease”

Thank you

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