

## Effects of an isoflavone supplement on the menstrual cycle in premenopausal women

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Isoflavones are diphenolic compounds found in the legume family. Their structural similarity to endogenous oestrogens confers weak oestrogenic and antioestrogenic activity, which is dose-dependent and tissue-specific. High intake of legumes in many traditional cultures means that Asian and vegetarian diets contain moderate to high levels of isoflavones. These diets are associated with lower levels of oestrogens in blood and reduced risk of hormone sensitive cancers. The aim of this study was to examine the short-term effects of an isoflavone supplement on oestrogen metabolism and the menstrual cycle in premenopausal women. We hypothesised that isoflavones would decrease oestrogen concentrations in plasma, urine and faeces, due to decreased synthesis of ovarian oestrogens; and increase menstrual cycle length due to lowered preovulatory oestrogen levels which would delay the time of ovulation.

Participants were 11 healthy women (age: 18-48 y; BMI: 17-26 kg/m<sup>2</sup>) with regular menstrual cycles, stable body weight, and not taking an oral contraceptive pill. The study was conducted over 4 menstrual cycles in a randomised, placebo-controlled, cross-over design. Subjects consumed an isoflavone supplement (86 mg/d) corresponding to typical intakes in Asian diets. Blood samples, 24-hour urine and 24-hour faecal samples were collected during the second cycle of each treatment period for measurement of oestrogens, progesterone and sex hormone binding globulin (SHBG). Ovulation was timed by measurement of urinary luteinising hormone and diet was monitored to ensure baseline intake did not change. Only plasma data are presented below.

As hypothesised, the isoflavone supplement increased mean follicular phase length by 1.9 days due to a delay in the time of ovulation ( $P=0.01$ ). However, unexpectedly there was a trend towards a 17% increase in mean plasma oestradiol concentration ( $P=0.08$ ) that was greatest in women with lowest baseline oestradiol levels ( $\rho = -0.74$ ,  $P=0.02$ ) (Figure). A small 7% decrease in plasma SHBG ( $P=0.051$ ) was observed but no significant change in plasma progesterone.

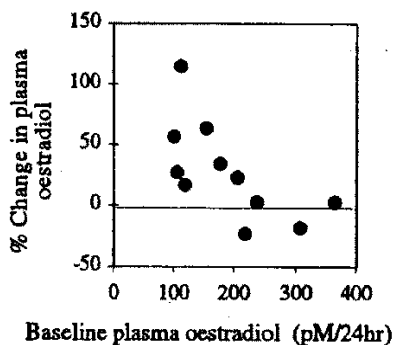


Figure. Change in plasma oestradiol during isoflavone supplementation was inversely associated with baseline (placebo) oestradiol concentrations ( $\rho = -0.74$ ,  $P=0.02$ , Spearman rank correlation) ( $n=11$ ).

Our study shows that a short-term supplement with a physiological dose of isoflavones can significantly alter menstrual cycle characteristics in healthy, premenopausal women. Although the non-significant increase in plasma oestradiol does not support our hypothesis, it confirms a previous study in which a 45mg/d isoflavone supplement delayed ovulation and increased circulating oestradiol by 37% during the follicular phase (1). Further, our data suggest that the oestrogenic response to isoflavones may depend on ambient concentrations of plasma oestradiol since women with higher baseline levels responded with little change or a decrease in oestradiol, while in those with lower baseline concentrations showed increases. However these conclusions are tentative and require confirmation in a larger group of women.

1. Cassidy A, Bingham S, Setchell K. Biological effects of a diet of soy protein rich in isoflavones on the menstrual cycle of premenopausal women. *Am J Clin Nutr* 1994;60:333-340.