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Benefits of soy-based feeds for fetal estrogen levels and obesity in adulthood

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We examined the effect of maternal exposure to naturally occurring estrogenic chemicals in diets on circulating levels of estradiol in mouse fetuses. An animal's specific response to estrogen can vary according to the time of exposure. The time when the fetus is sensitive to permanent "programming" effects of estrogen is called a "critical period" in development of organ systems. An important factor in the regulation of estrogen in the fetus is the composition of the mother's diet. Our hypothesis was that if a diet that was fed to pregnant mice during the fetal critical period contained estrogenic chemicals, these chemicals would "estrogenize" the fetus. In contrast to this prediction, a casein-based diet with virtually no estrogenic chemicals led to significantly higher levels of endogenous estradiol relative to a soy-based diet with very high levels of estrogenic chemicals. In a follow-up experiment we compared a soy-based diet containing estrogenic chemicals with a soy-based diet from which these estrogenic chemicals were extracted. The complete soy diet resulted in estradiol levels of 60 pg/ml in fetal serum, while the extracted soy diet dramatically increased serum estradiol by over 50%. This finding shows that the naturally occurring estrogens in soy (phytoestrogens) fed to pregnant mice reduce endogenous estradiol levels in the fetuses. This is important since elevated levels of estradiol during fetal life "program" certain characteristics into the animal later on in adulthood. One of these characteristics is obesity. Obesity is associated with Type II diabetes, and the mice with elevated fetal estradiol levels show evidence of impaired glucose tolerance in later adulthood. These effects are relevant since obesity and diabetes are abnormalities in humans that are increasing.