NUTRITION

High isoflavone intake delays puberty onset and may reduce breast cancer risk in girls

High consumption of dietary isoflavones is associated with a marked delay in pubertal timing in girls, which could potentially reduce the risk of breast cancer later in life, say the authors of a report published in the *American Journal of Clinical Nutrition*. A second study published in *Pediatrics* reveals that the fall in age at puberty onset—a trend that has been observed over the past 20 years—still continues among young, white girls.

Epidemiologic studies have indicated that the age at menarche is related to breast cancer, which suggests that factors influencing age at onset of puberty could affect the risk of breast cancer. Other studies have previously proposed protective effects of dietary isoflavone intake on breast cancer risk. "Moreover, foods that contain high amounts of isoflavones are often rich in dietary fiber, which was also suggested to be relevant to puberty timing in some prospective studies," adds Guo Cheng (Research Institute of Child Nutrition, Dortmund, Germany), lead author of the *American Journal of Clinical Nutrition* article.

To address the potential relevance of dietary isoflavones and fiber for the timing of puberty, Cheng *et al.* used prospectively collected data from the DONALD (Dortmund Nutritional and Anthropometric Longitudinally Designed) study on 227 healthy children who were enrolled before the pubertal growth spurt.

The repeated detailed measurements of anthropometric and pubertal development parameters in the DONALD study, both in girls and boys, enabled Cheng *et al.* to differentiate between early and late stages of pubertal development and to characterize maturation related to both sexual and growth pubertal markers.

Early stages of maturation were defined as Tanner stage 2 for breast development (formation of breast buds and widening of the areola) or genital development (testis volume ≥4 ml) according to sex-related markers and age at onset of the pubertal growth spurt (take-off) for growth-related markers. Late maturation stages were defined by age at menarche or voice break for sex-related markers and the age at peak height velocity (the maximum of the pubertal growth spurt) for pubertal markers related to growth.

Girls with a diet in the highest isoflavone tertile during prepuberty reached Tanner stage 2 for breast development about 0.7 years later and peak height velocity approximately 0.6 years later than did girls whose diet was in the lowest isoflavone tertile, after adjustment for prepubertal BMI and fiber intake. In other words, both early and late stages of pubertal developement were delayed in girls with the highest consumption of isoflavones. However, dietary isoflavone intake did not appear to influence the timing of puberty in boys.

In addition, the findings did not support an independent role of dietary fiber intake in puberty timing in either boys or girls. The association of fiber intake with puberty timing determined in previous studies could, therefore, potentially reflect an effect of dietary isoflavones.

"Given that both a later age at peak height velocity and at menarche are related to a reduced risk of breast cancer, considerable delay of pubertal timing (~7–8 months) associated with higher dietary isoflavones may translate into a 6% reduction of breast cancer risk," comments Cheng. "Dietary isoflavone intake in our sample was high and may partly reflect the increasing use of soy protein or soy flour in processed foods over the past 20 years. Hence, dietary isoflavone intake may become increasingly relevant to puberty timing in white children."

In the second study, a group of US investigators aimed to address the relationship between environment and breast cancer. Biro and colleagues, therefore, recruited 1,239 girls aged 6–8 years at three different sites. The researchers found that the proportion of white girls who had breast development at 7–8 years of age was notably greater than that reported from studies of girls born 10–30 years earlier, which indicates that the previously observed trend of a fall in age at puberty onset continues. An increase in BMI accounts, at least in part, for this observation.

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Biro *et al.* have amassed urine and blood specimens, as well as diet and physical activity patterns, which await longitudinal analyses to further elucidate environmental influences on cancer risk.

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Original articles Cheng, G. *et al.* Relation of isoflavones and fiber intake in childhood to the timing of puberty. *Am. J. Clin. Nutr.* **92**, 556–564 (2010) | Biro, F. M. *et al.* Pubertal assessment method and baseline characteristics in a mixed longitudinal study of girls. *Pediatrics* **126**, e583–e590 (2010)