

Adrenarchal androgens, prepubertal macronutrient intake, and pubertal timing

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Background: Whether adrenarche (the increase of adrenal androgen production during childhood) alone or in combination with prepubertal macronutrient intake influence the timing of puberty is unknown.

Methods: Daily adrenal androgen (AA) excretion rates were quantified by GC-MS in 111 prepubertal healthy free-living children (56 boys), for whom 24-h urine samples, 3-day weighed dietary records and anthropometrical data 1 and 2 year before the start of pubertal growth spurt (age at takeoff; ATO) as well as information on Tanner stages and birth characteristics were available. Multivariate regression analysis (adjusted for sex, fat mass and total energy intake) was performed to examine the independent associations of AA and macronutrients intake (mean of 1 and 2 y before ATO) with outcomes: ATO, age at peak height velocity (APHV), growth spurt duration (APHV minus ATO), age at menarche/voice break (M/VB), and ages at Tanner stage 2 for breast (girls) /genital (boys) (B2/G2) and pubic hair (PH2) development.

Results: Higher AA secretion predicted earlier age at B2/G2 ($P < 0.01$) and age at PH2 ($P < 0.0001$) as well as shorter growth spurt duration ($P < 0.01$). Children with a higher AA secretion had a 0.8 year earlier age at B2/G2 and a 1.5 year earlier age at PH2 than those with a lower AA excretion. Independent of AA secretion, animal protein intake showed negative associations with ATO ($P < 0.05$), APHV ($P < 0.05$), and age at M/VB ($P = 0.06$). Other macronutrients did not show significant associations with any of the puberty outcomes.

Conclusion: A more intensive adrenarchal process may precipitate a shorter growth spurt and an earlier onset of breast and genital development in girls and boys, respectively. Animal protein intake, however, might independently trigger earlier ATO and APHV.

[Supported by a research grant from the Long-range Research Initiative (LRI) of the European Chemical Industry Council (Cefic).]