Decrease in Plasma High-Density Lipoprotein Cholesterol Levels at Puberty in Boys With Delayed Adolescence: Correlation With Plasma Testosterone Levels

Kirkland and co-workers performed a three-phase study to test the hypothesis that the decrease in the high-density lipoprotein cholesterol (HDL-C) level that occurs at puberty is related to an increase in the plasma testosterone concentration. HDL-C is the fraction of total cholesterol concentration that is inversely related to the incidence of coronary artery disease.

Plasma HDL-C levels are similar in both sexes during childhood until a decrease in the HDL-C level occurs in boys around the age of puberty, with the major drop occurring between 12 to 13 and 14 to 15 years of age. Subsequently, males maintain lower HDL-C levels than do females throughout adult life.

The first phase of the study in boys (ages 10.1 to 16.9 years) with short stature, delayed adolescence, or both investigated the relationship between plasma testosterone and HDL-C. The boys were classified into four stages of pubertal development by clinical examinations (testis length and penile length). Advancing pubertal stages were associated with increasing levels of testosterone and decreasing levels of HDL-C.

In the second phase of the study, fourteen boys (ages 13.3 to 16.8 years) with constitutional delay of pubertal development were evaluated during and after treatment with testosterone enanthate. Within one to two weeks after injection, a rise in plasma testosterone levels and a concomitant decrease in HDL-C levels were observed.

The third phase of the study was designed to determine the relationship between plasma testosterone and HDL-C levels during spontaneous onset of puberty following treatment with testosterone. In thirteen subjects with constitutional delay of sexual development, the spontaneous increase in plasma testosterone levels was accompanied by a decrease in the HDL-C level.

Kirkland RT, Keenan BS, Probstfield JL, et al. *JAMA* 1987; 257:502-507.

Editor's comment—*This study provides evidence that testosterone, both endogenous and exogenous, directly or indirectly influences HDL-C metabolism during puberty. The results of the treatment phase suggest a cause-and-effect relationship between the increase in the plasma testosterone level and the decrease in the HDL-C level.*

It should be remembered that during spontaneous puberty, testosterone secretion is highly episodic only at night with significantly decreased levels during the day. Thus, the correlations noted are really underestimates of the actual physiologic condition.

These data are convincing and should allow interventional protocols to be devised to attempt to raise HDL-C in young men as "prophylaxis" against coronary artery disease.

Biosynthetic Somatomedin-C (Sm-C/IGF-I) Increases the Length and Weight of Snell Dwarf Mice

Somatomedins are thought to mediate the effects of growth hormone (GH) on body growth. However, whether Sm-C/IGF-I will also stimulate true skeletal growth (body length) and maintain the harmony of the weight/length relationship and the growth of various organs has not been determined. This study reports the effects of biosynthetic IGF-I on various growth parameters of GH-deficient Snell dwarf mice.

Groups of animals received either buffer (control), human growth hormone (hGH), or one of three doses of IGF-I three times daily for four weeks. Body length and weight were measured once a week. At the end of the study, organs were removed and weighed. Only the highest dose of IGF-I, 7.4 μg per day, was effective in increasing both the length and weight of the mice. In addition, hGH 2.8 μg/day induced significant but similar increases over controls. The relative weight of the heart of the hGH-treated mice was significantly increased, when compared to the IGF-I treated group and the controls.

van Buul-Offers S, Ueda I, van den Brande JL. *Pediatr Res* 1986; 20:825-827.

Editor's comment—*These results indicate that circulating IGF-I can lead to increased body length and weight in dwarf mice. However, they do not indicate whether this situation is physiologic, since hGH was more effective than IGF-I molar for molar. Recent results from other investigators indicate that both GH and IGF-I are important to linear growth. According to the dual effector hypothesis, GH leads to differentiation (commitment) of cells and IGF-I to clonal expansion of those differentiated to permit an orderly and efficient process of growth. The data from the present study indicate that IGF-I alone can lead to overgrowth, but they do not indicate whether this is the physiologic or most efficient mechanism of growth.*