Tall Stature

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Tall stature is rarely pathologic, but the pediatric health care clinician must be able to distinguish familial causes from those due to endocrine or genetic reasons. Defined as a height 2 SDs above the mean for age and sex or greater than the 95th percentile, tall stature is usually familial or secondary to obesity. Although there is known psychological stigma associated with short stature, the paucity of evidence that tall stature in females or males is psychologically detrimental makes the previous practice of sex hormone administration to decrease ultimate adult height no longer acceptable.

When evaluating tall stature, it is first necessary to plot serial height measurements during multiple visits. If these measurements confirm the criteria for tall stature, the clinician should calculate the child's projected adult height by calculating the midparental height as follows:

Boy's Projected Height in Centimeters: (Father's Height + Mother's Height + 13)/2

Girl's Projected Height in Centimeters: (Father's Height − 13 + Mother's Height)/2

Parental heights should be measured directly because self-reported heights are often overestimated, especially in men. If a child has at least one tall parent and plots within 5 cm of the target adult height range, he/she is considered to have familial, or constitutional, tall stature. In this circumstance, no further investigation is warranted as long as the child is developing normally and has normal physical examination findings. Measurement of body proportions is also important, including upper body to lower body ratios and arm span, because these measures can help differentiate between pathologic and familial tall stature. At birth, the upper extremity to lower extremity ratio should be 1.7. By early childhood, this proportion should be 0.89 to 0.95. In addition, a child's arm span is generally 1 cm shorter than his height, whereas an adolescent's arm span is generally equal to his height. Klinefelter syndrome should be considered in a patient with tall stature, increased arm span, sparse hair, small testes, and a high-pitched voice, predicating the need for karyotype testing. A tall patient with decreased upper to lower body segment ratio, hyperextensible joints, and scoliosis may have Marfan syndrome.

If pathologic tall stature is suspected, a bone age radiograph of left hand, fingers, and wrist should be ordered. A normal bone age is consistent with familial tall stature, whereas accelerated bone age in a nonobese child must lead the pediatrician to consider precocious puberty or growth hormone excess. Obesity leads to tall stature in childhood with a normal final adult height and is associated with accelerated skeletal maturation. Although the exact mechanism for obesity's role in tall stature is not

Effect of Obesity on Linear Growth. Fennoy I. *Curr Opin Endocrinol Diabetes Obes*. 2013;20(1):44–49

Do Centimetres Matter? Self-reported Versus Estimated Height Measurements in Parents. Gozzi T, Fluck CE, Dattani MT, et al. *Acta Paediatr*. 2010;99(4):569–574

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understood, the hormone ghrelin, the growth hormone secretagogue receptor, insulin-like growth factors, and insulin all have the potential to mediate linear growth.

In conjunction with bone age, precocious puberty can be diagnosed with Tanner staging and assessing testicular volume in males, with a postpubertal testicular volume being greater than 4 mL. Patients with late-onset congenital adrenal hyperplasia present with precocious puberty, tall stature, and an increased 17-hydroxyprogesterone level in the blood. Growth hormone excess is rare in children, yet when present is usually due to pituitary adenomas. Growth hormone excess before epiphyseal fusion results in tall stature and markedly increased height velocity. If it occurs after epiphyseal fusion, adolescents may also have signs of acromegaly, such as coarsening of facial features, enlarged jaw, and distal body overgrowth, including large hands and feet.

There are other rare genetic syndromes associated with tall stature, all of which have significant clinical stigmata that should be apparent on physical examination. Sotos syndrome should be considered if the bone age is accelerated and the child has accompanying symptoms of facial flushing, frontal bossing, and a narrow face and head. Beckwith-Wiedemann syndrome is considered if hypoglycemia is present at birth, along with anterior abdominal wall defects and macroglossia. Marshall-Smith syndrome is associated with unusually rapid physical growth, abnormal facies, and respiratory issues.

A pediatric health care professional can diagnose most causes of tall stature with a careful history and physical examination. If suspicion is high for disease or the cause is unclear, the clinician should consider radiographic bone age and focused laboratory testing. Although the social stigma behind tall stature has decreased, clinicians must still be aware of potential pathologic causes of tall stature that would warrant intervention.

COMMENTS: This In Brief emphasizes the importance of accurate height measurements. My experience is that height measurement can often be inaccurate, especially in supine measurements in young children or very active children who have difficulty standing still. When transitioning from supine measurements to standing measurements in toddlers, there may appear to be a false perception of a decrease in height because standing height is often shorter than supine length. Accurate measurement of upper to lower body segment ratios is important in identifying several syndromes and can be performed in the following way. To measure lower body segment, measure from the symphysis pubis of the patient to the floor. The upper segment can be calculated by subtracting the lower segment from the total height. Measurement of arm span is best accomplished by measuring from the tip of the middle finger of one hand, with arms outstretched at a 90° angle to the tip of the middle finger of the other hand.

A recent study of self-reported adult height measurements in parents found that men have a tendency to overestimate their heights but women's self-report is more accurate. When looking at estimating the other parent's height, women were more likely to overestimate the men's height, whereas men were more accurate in estimating women's height. Their conclusions were that attempts should be made to use measured heights of parents when the results would have an effect on diagnostic workup or treatment of patients with tall stature.

– Janet Serwint, MD
Consulting Editor, In Brief

CME Quiz Correction

A revision to the order of questions in the November 2014 article "Pediatric Hearing Loss" (Grindle CR. *Pediatrics in Review.* 2014;11:456, doi: 10.1542/pir.35-11-456) led to an error in the online answers. The correct order for the article's answers should be: 1. D; 2. B; 3. A; 4. C; 5. C. The online version of the quiz and answer key have been corrected. The journal regrets the error.

ANSWER KEY FOR DECEMBER 2014 PEDIATRICS IN REVIEW:
Borrelia Burgdorferi (Lyme Disease): 1. E; 2. A; 3. D; 4. D; 5. C.
Complementary and Integrative Methods in Fibromyalgia: 1. D; 2. E; 3. B; 4. C; 5. E.
Respiratory Syncytial Virus Infection and Bronchiolitis: 1. C; 2. A; 3. B; 4. E; 5. B.

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