

## ***Timmy and the “Big Kids”***

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### **Part I**

Timmy is an 11 year and 10 month old boy who comes to your office with his mother and father. He has always been short for his age. Over the past 1 to 2 years, his mother has noticed that he seems even smaller compared to his peers.

Review of the clinic medical record reveals that Timmy was born after a full term pregnancy at a weight of 3kg (6 lb 10 oz). The delivery was spontaneous and vaginal and without complications. He achieved all of his early developmental milestones on time and has always done well in school. Timmy has a history of moderate asthma. He has required hospitalization on five different occasions, and has been given prescriptions for short courses of oral prednisone at least twice yearly. He has multiple environmental allergies. His current treatment consists of a cromolyn sodium metered-dose-inhaler (MDI), 2 inhalations TID; a beclomethasone MDI, 2 inhalations TID; and an albuterol MDI, 1 or two inhalations prn for wheezing.

*"How are things going in school," you ask.*

*Timmy replies that “school is OK except when I get teased by the bigger kids.”*

*He states that he has many friends outside of school, and he enjoys bicycling, soccer, and basketball.*

Physical examination reveals a well-nourished male who appears small for his chronological age. His height is 132.75cm (52¼ in) and his weight is 30kg (66 lb.) (see Growth chart). His sexual maturity rating for pubertal development is Tanner I. Hearing and vision screens are normal. The remainder of his exam is unremarkable.

*Timmy’s father wants to know if growth hormone therapy would help his son to be taller. “We have some close friends whose son was short. He got hormone shots and he’s grown about 6 inches in the last year. Wouldn’t that stuff help Timmy, too? You know, doctor, Timmy’s a good hoops player, but unless he grows a lot more he’ll never get to play on the varsity squad.”*

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### **Part II**

At your visit, you obtain family history, additional measurements, and a hand and wrist x-ray for bone age.

Timmy’s father is 174 centimeters (68 ½ in), and his mother is 161.3 centimeters (63 ½ in). Timmy’s father remembers still changing clothes sizes late in high school, and his mother had menarche at age 15 years.

On physical examination, Timmy appears to have normal body proportions, but to be sure you measure his arm span from middle fingertip to middle fingertip and his lower segment from top of his pubic symphysis to the floor. His arm span is 133.3 centimeters (52 ½ in) and this should be approximately equal to his height if he has normal proportions. His lower segment is 67 centimeters (26 ¼ in) which you subtract from his height to calculate a ratio of upper to lower segment (.99).

His bone age is read as 9 years.

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### **Epilogue**

Timmy’s x-ray for bone age allows you to predict his final height of 168 to 170 centimeters (66 to 67 in). Based on your findings and recommendations, Timmy does not receive any medical treatment for his growth. At age 14 years, he has testicular enlargement. At age 14 ½ years, he has developed pubic hair. At age 15 years, his growth rate accelerates and continues to increase at age 16 years.

He also sees the school psychologist weekly to work on family conflicts and self-esteem. At age 16 ½ years, he is reasonably comfortable with his stature, has good peer relationships, and is on the soccer team.

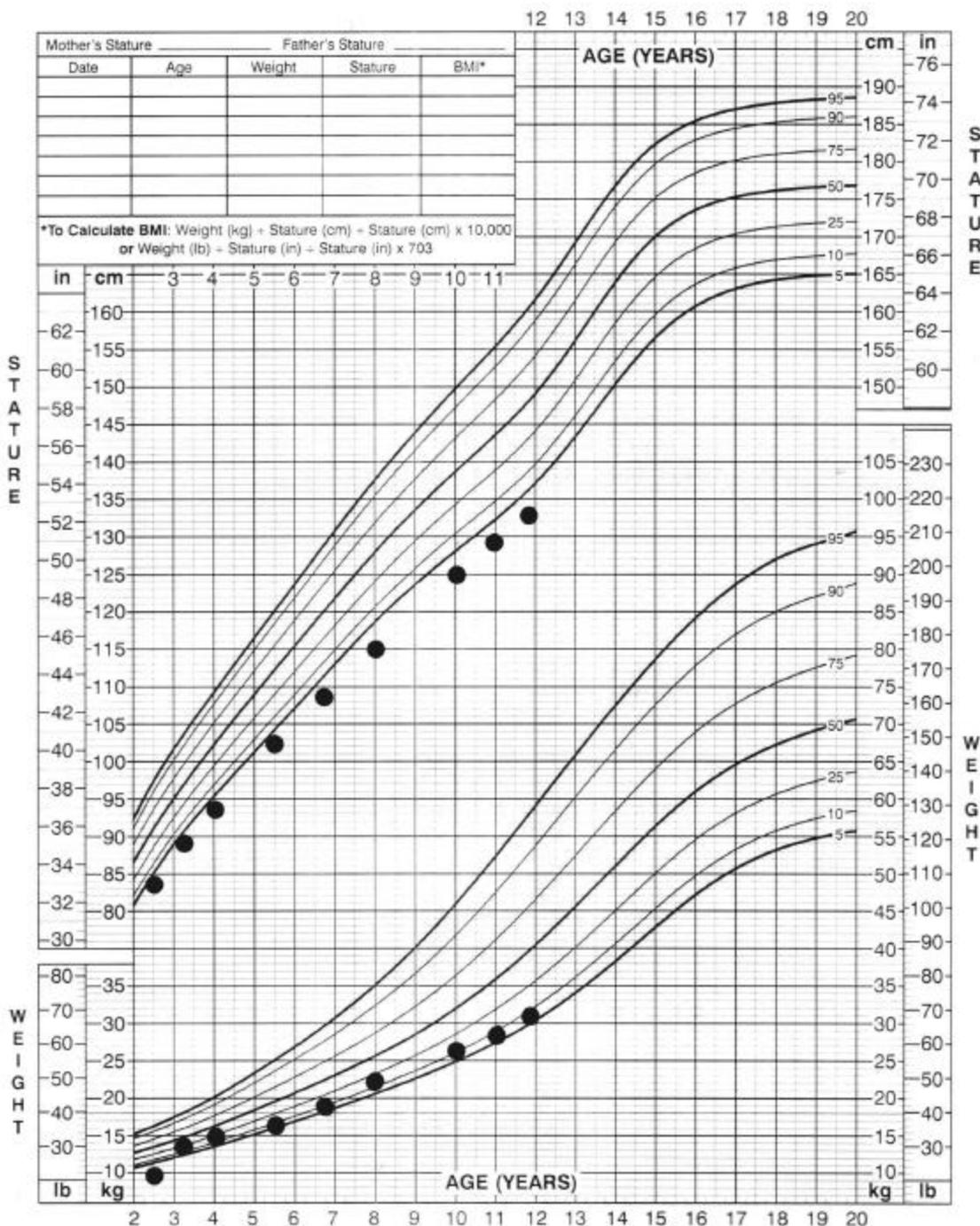
# Timmy and the "Big Kids"

## Handout #1: Timmy's Growth Chart

2 to 20 years: Boys

Stature-for-age and Weight-for-age percentiles

NAME Timmy  
RECORD # \_\_\_\_\_

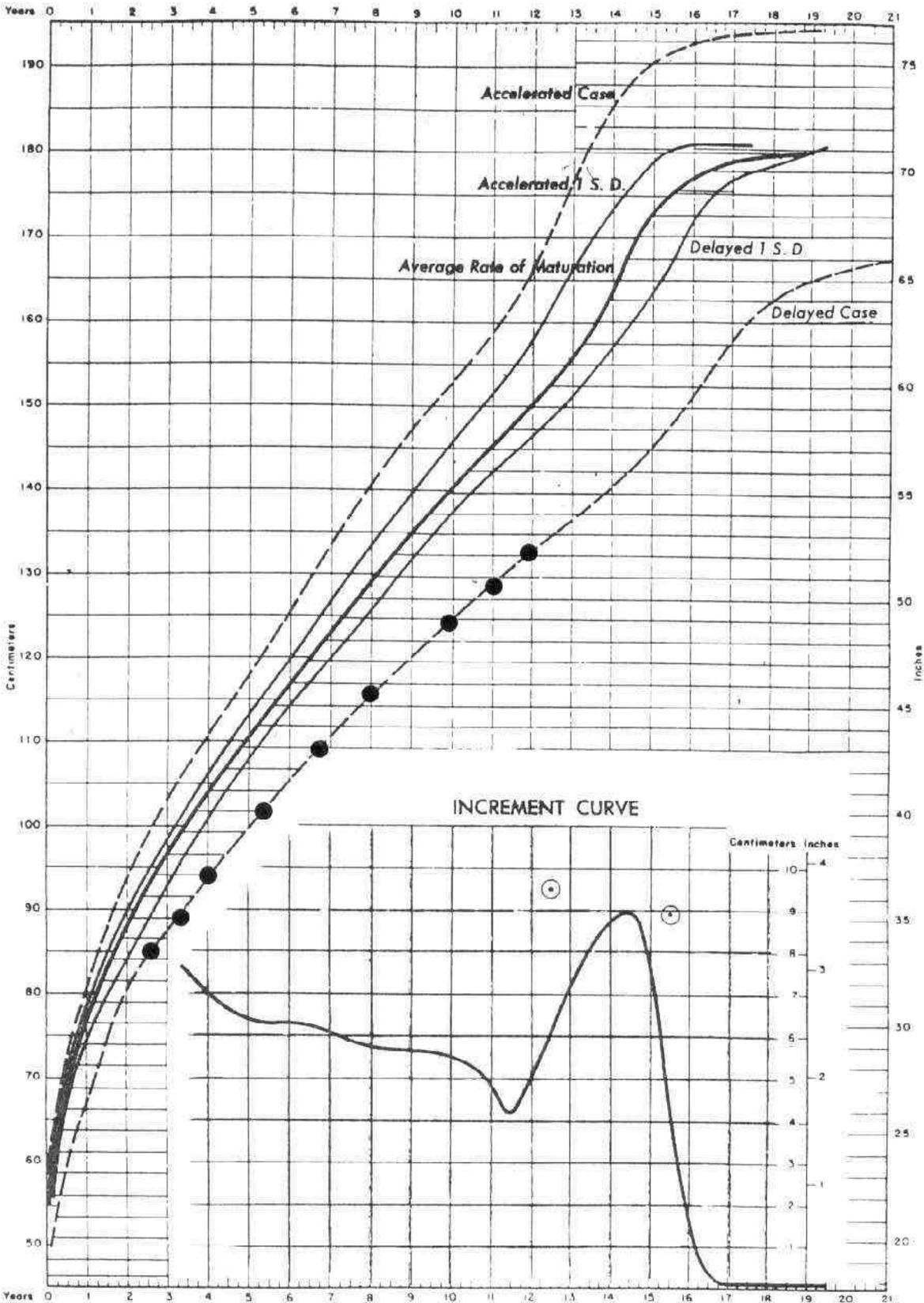


Revised and corrected November 28, 2000.  
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).  
<http://www.cdc.gov/growthcharts>



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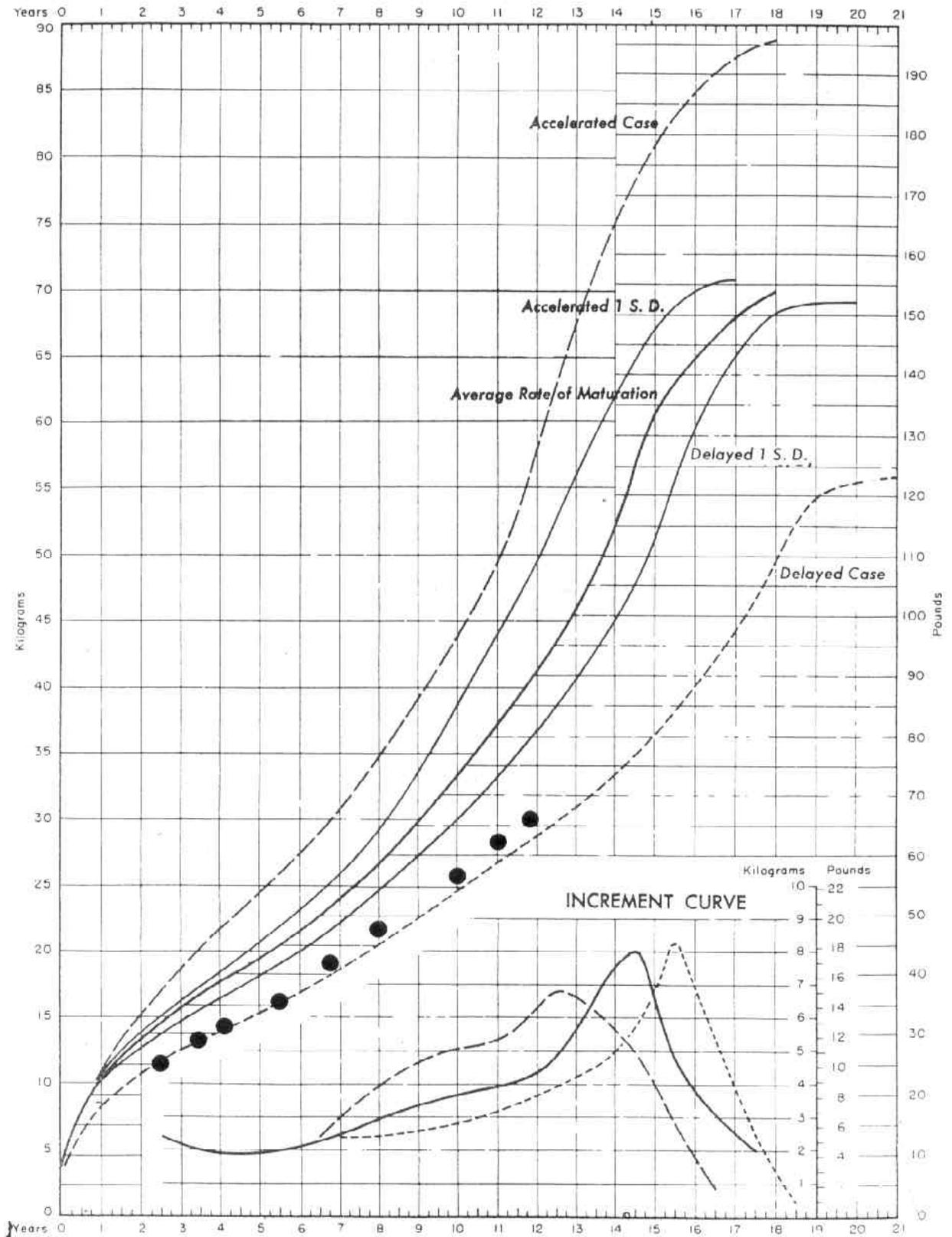
## Handout #2a: Bayer & Bayley Growth Curves of Height



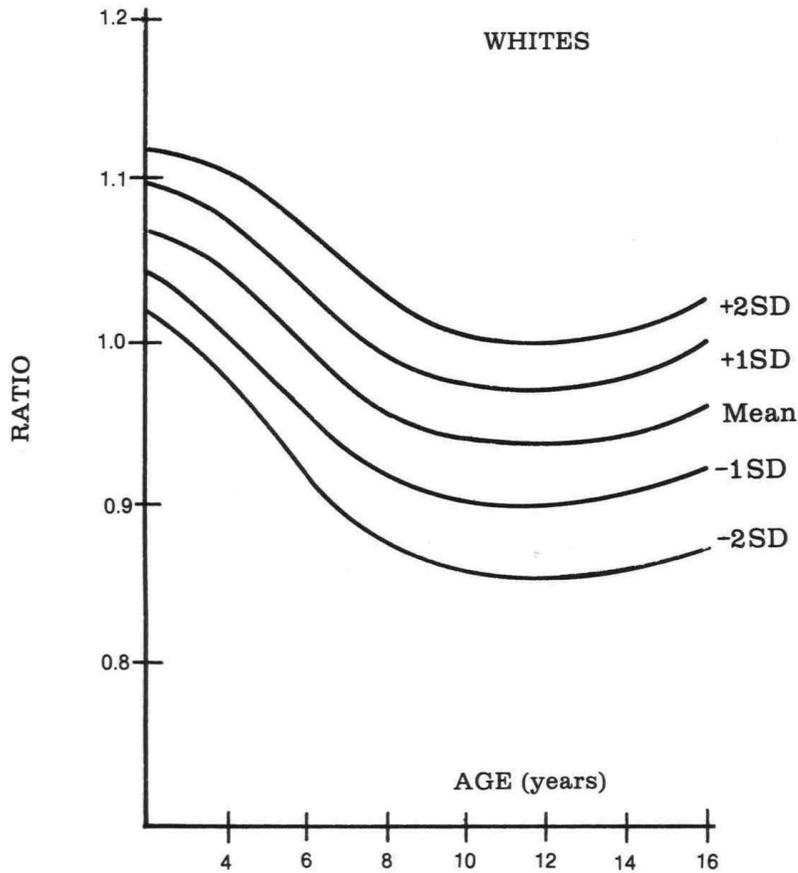
Reproduced with permission by Ross Laboratories, Columbus 16, Ohio, from Bayer, L., and Bayley, N.: Growth Diagnosis, University of Chicago Press, 1959.

# Timmy and the "Big Kids"

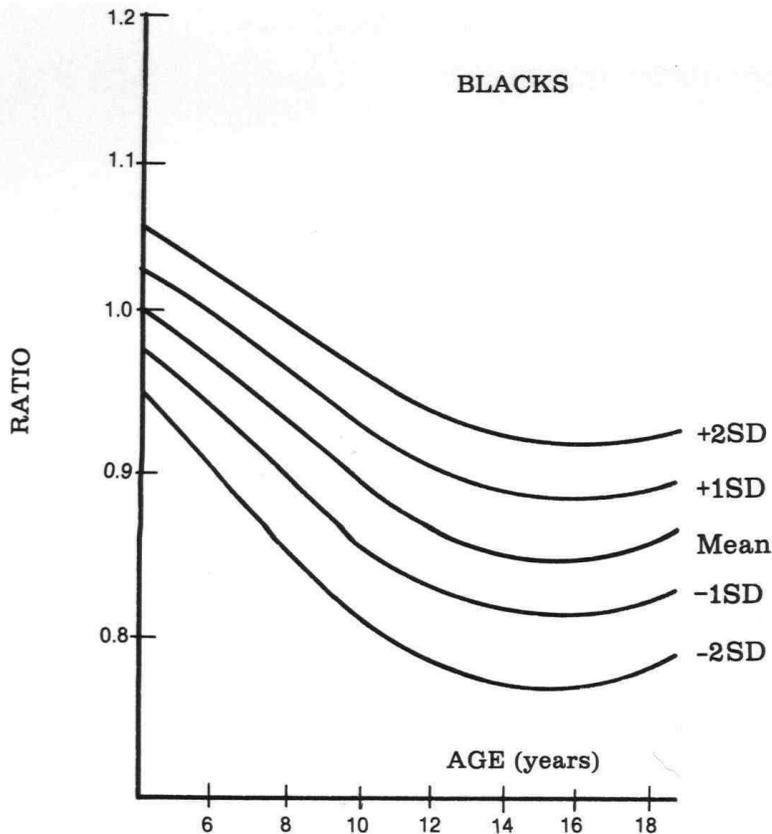
## Handout #2b: Bayer & Bayley Growth Curve of Weight



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**Handout #3: Upper:lower Segment Ratios**



Upper segment:lower segment ratios for whites (above) and blacks (below) with mean and 2 standard deviations shown. Data collected in 1959 from 2104 Baltimore school children (white 1015, black 1089). McKusick VA: *Heritable Disorders of Connective Tissue*, CV Mosby, 1972.



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**Handout #4: 9 Year Old Hand and Wrist Radiograph for Bone Age**



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### **Bibliography:**

#### Growth rates and monitoring growth

1. Monitoring and Assessment of Growth, The Primary Care Perspective [slide series], Genentech, Inc.
2. Greulich WW and Pyle S. *Radiographic Atlas of Skeletal Development of the Hand and Wrist*. Stanford, CA: Stanford University Press; 1959.
3. Rosenfield RG. Skeletal Maturation (Bone Age). In Sperling MA, editor. *Pediatric Endocrinology*. Philadelphia: W.B. Saunders Co; 1996. p.120-121.

#### Short stature

4. Cowell CT. Short Stature. In Brook CGD, editor. *Clinical Paediatric Endocrinology*. Oxford: Blackwell Science LTD; 1995. p. 136-172.
5. Linder B, Cassoria F. Short stature, etiology, diagnosis, and treatment. *Journal of the American Medical Association* 1988;260:3171-3175.
6. Mahoney CP. Evaluating the child with short stature. *Pediatric Clinics of North America* 1987;34:825-849.
7. Shulman DI, Bercu BB. Growth hormone therapy: An update. *Contemporary Pediatrics* 1998; 15:95-110.

#### Inhaled steroids and growth

8. Crowley S, Hindmarsh PC, Matthews DR, Brook CGD. Growth and the growth hormone axis in prepubertal children with asthma. *Journal of Pediatrics* 1995;126:297-303.
9. Doull IJM, Freezer NJ, Holgate ST. Growth of prepubertal children with mild asthma treated with inhaled beclomethasone dipropionate. *American Journal of Respiratory Critical Care and Medicine* 1995;151:1715-1719.

#### Use of growth hormone in non-growth hormone deficient short children

10. Lawson Wilkins Pediatric Endocrine Society. Guidelines for the Use of Growth Hormone in Children. 1995.
11. Loche S, Cambiaso P, Setzu S, Carta D, Marini R, Borrelli P, Cappa M. Final height after growth hormone therapy in non-growth-hormone deficient children with short stature. *Journal of Pediatrics* 1994;125:196-200.
12. Moore WV, Moore KC, Gifford R, Hollowell JG, Donaldson DL. Long-term treatment of children with short stature and normal growth hormone secretion. *Journal of Pediatrics* 1992;120:702-708.

### **Suggested Readings:**

**Amer K and Brill M. (Illustrations by L. Amer). *Short Mort and the Big Bully*. Bethesda, MD: Association for the Care of Children’s Health; 1996.** This is a story about an 11 year old boy who is short. It is a wonderful resource to recommend to young patients and includes material on how to constructively deal with teasing, and how to build one’s self-confidence. The reading level is approximately 5<sup>th</sup> grade. Copies may be obtained by calling 301-654-6549.

**Mahoney CP. Evaluating the child with short stature. *Pediatric Clinics of North America* 1987; 34:825-849.** A timeless review article which describes normal growth patterns, the evaluation of short stature, and diseases causing short stature.

**Shulman DI, Bercu BB. Growth hormone therapy: An update. *Contemporary Pediatrics* 1998; 15:95-110.** This article discusses when treatment with recombinant growth hormone is appropriate.

### **Educational Resources on the World Wide Web**

*The National Center for Health Statistics*

<http://www.cdc.gov/nchs/> (Home page); <http://www.cdc.gov/growthcharts/> (Growth charts)