

Skeletal Age Testing: Background



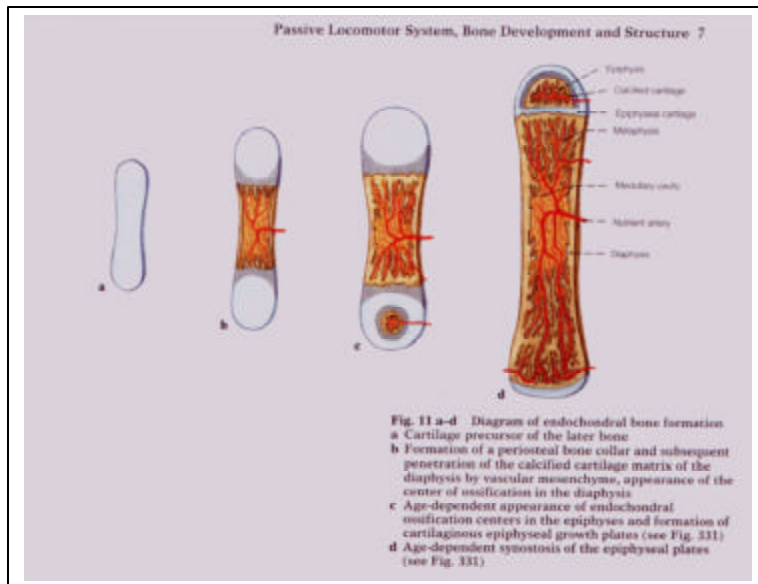
The Purpose of Skeletal Age Testing

Skeletal age testing, sometimes known as bone age assessment, is used to provide more accurate information about the developmental status of a child than can be inferred from his/her height, weight, and age alone. Results serve to identify growth patterns and deficiencies for pediatric patients. At least 5% of children and adolescents are categorized as having short stature or growth abnormalities, and these children – and as well as others – are tested for skeletal maturity to track their growth development and spot any problems in growth.

As a rule, most skeletal age testing is done on children between the ages of 5 and 18. The most popular indication for this testing is short stature. When a child is being under supervision, the test is generally carried out once or twice a year. The physician uses the results of this test to reveal information about the skeletal and physical maturity of the patient.

The Physical Changes That Enable Measurement of Skeletal Age

The cartilage structures of the wrist undergo a process of ossification (that is, hardening into bone) during growth. As in other long bones, the development process begins with the appearance of ossification in the diaphysis, followed by ossification centers in the epiphyses and the formation of epiphyseal growth plates. The fusion of the epiphyseal growth plates marks the end of the child's growth. These changes in the cartilage and bone structure of the wrist follow a standard pattern and rate in most children and adolescents, and this pattern of change has been documented in the widely used Greulich and Pyle Atlas.¹ The Greulich and Pyle Atlas records the appearance of the bone structure at the left hand and wrist of male and female children and adolescents at 3-12-month intervals, depending on the child's age. The physician determines the bone age of a patient based on the development of his bones in comparison to the X-rays in the Atlas.



Bone development of long bones, from birth to adulthood (left to right), from: Sobotta, Atlas of Human Anatomy, 12th ed., Edited by R. Putz and R. Pabst, Vol. 1 p. 7, Williams & Wilkins, Baltimore, 1997.

Use of Bone Age Scores

For children and adolescents with short stature, bone age assessment may be used to determine how much growth potential a short child really has. If the patient's bone age is reduced within a normal range (generally within two years of his chronological age), he has additional growth potential and is likely to reach a taller adult height than his current height would indicate. If the patient's bone age is reduced more than the normal range, additional investigation is needed to identify a possible hidden hormonal or health problem. Bone age assessment also helps the physician predict adult height of pediatric patients more accurately.

For children and adolescents for whom growth abnormalities are suspected, bone age tests are used to help determine if endocrine (glandular) abnormalities are present or should be further investigated. For children who are using growth hormone therapy, bone age testing is used for monitoring the effects of therapy.

References

¹ Greulich WW, Pyle SI, Radiographic atlas of skeletal development of the hand and wrist, 2nd ed. Stanford California, Stanford University Press, 1959.