

How precisely can we measure increments of bone age and Bone Health Index with an automated method in boys with Klinefelter syndrome?

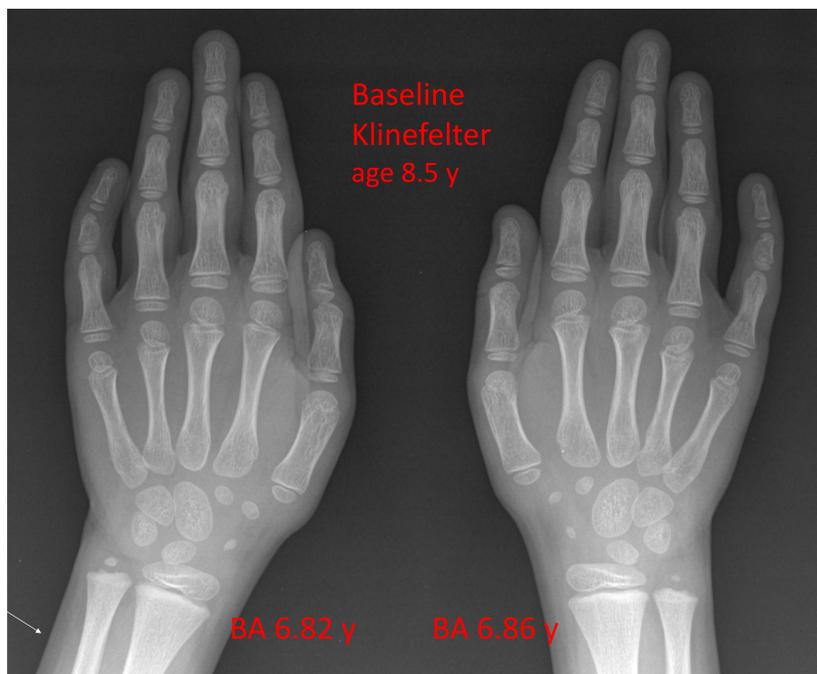
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Background: The assessment of bone age increments is important when monitoring treatment in many conditions in pediatric endocrinology. However, manual rating suffers from significant rater variability. Automated bone age assessment could provide increased precision, and also assess increments of Bone Health Index (BHI) from the same X-rays.



Left hand
Bone age increment 2.02 y
BHI increment 0.50 (11%)
BHI SDS increment 1.16

Right hand:
Bone age increment 1.93 y
BHI increment 0.40 (9%)
BHI SDS increment 0.80



Objective: To assess the precision of automated assessment of increments of bone age and BHI.

Methods: We included 77 boys aged 4-12 years with Klinefelter syndrome from NCT00348946 with X-rays of left and right hand at five visits separated by 6 months. Half of them were treated with oxandrolone.

Bone age and BHI of each hand were obtained with BoneXpert.

We assumed the bone age increments in the left and right hands to be the same, if the measurements were “perfect”, so that the deviation between them is due to the imprecision of the measurements.

Results: The SD between the increments was 0.24 y for bone age and 3.4% for BHI.

The precision SD of the increment assessed in one hand was therefore 0.17 y and 2.4% respectively, and the precision of a single bone age or BHI assessment was 0.12 y [0.10 y; 0.14 y] 95% confidence, and 1.7% [1.4%; 2.0%] respectively.

The results were the same on treated and untreated children and over the four periods.

Conclusions : Bone age increments can be assessed much more precisely with the automated method than with manual rating.

BHI can be determined from the same X-rays with a precision comparable to DEXA.

In studies of normal children a typical annual increment in BoneXpert bone age in prepubertal boys is 1.0 y with an SD of 0.30 y. This can thus be decomposed in quadrature into 0.17 y from method imprecision and 0.25 y from biological variation in speed of maturation; thus the automated method is well-suited for studying the relation of speed of maturation to puberty and hormonal development.

Reference

Thodberg HH, van Rijn R, Tanaka T, Martin DD, Kreiborg S: **A paediatric bone index derived by automated radiogrammetry**, Osteoporosis International Vol. 21 (8), pp 1391-1400 (2009)

See also www.BoneXpert.com

Disclosure: HHT is the owner of Visiana, which holds and markets the BoneXpert medical device