

Vicente Gilsanz  
Osman Ratib

# Hand Bone Age

A Digital Atlas of  
Skeletal Maturity

Second Edition

Bone Age for iPad®,  
iPhone®, and iPod touch®



 Springer

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A Digital Atlas of Skeletal Maturity

Second Edition

 Springer

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# Contents

<b>1</b>	<b>Introduction</b> . . . . .	1
<b>2</b>	<b>Bone Development</b> . . . . .	3
	Clinical Applications for Skeletal Determinations . . . . .	4
	Diagnosis of Growth Disorders . . . . .	5
	Final Height Predictions . . . . .	5
	Conventional Techniques for Skeletal Determinations . . . . .	6
	Computer Assisted Techniques for Skeletal Determinations . . . . .	8
<b>3</b>	<b>Indicators of Skeletal Maturity in Children and Adolescents</b> . . . . .	11
	Infancy . . . . .	12
	Toddlers . . . . .	12
	Pre-puberty . . . . .	14
	Early and Mid-puberty . . . . .	16
	Late Puberty . . . . .	16
	Post-puberty . . . . .	18
<b>4</b>	<b>Digital Bone Age Atlas</b> . . . . .	21
	Subjects . . . . .	21
	Methods and Techniques . . . . .	21
	Validation of Standards and Technique . . . . .	22
<b>5</b>	<b>Software User Manual</b> . . . . .	27
	iPhone and iPad Apps . . . . .	27
	Software Installation . . . . .	27
	Software User Manual . . . . .	28
<b>6</b>	<b>Reference Images</b> . . . . .	31
<b>7</b>	<b>Tables</b> . . . . .	91
	<b>References</b> . . . . .	95





Bone age assessment is frequently performed in pediatric patients to evaluate growth and to diagnose and manage a multitude of endocrine disorders and pediatric syndromes. For decades, the determination of bone maturity has relied on a visual evaluation of the skeletal development of the hand and wrist, most commonly using the Greulich and Pyle atlas. With the advent of digital imaging, multiple attempts have been made to develop image-processing techniques that automatically extract the key morphological features of ossification in the bones to provide a more effective and objective approach to skeletal maturity assessments. However, the design of computer algorithms capable of automatically rendering bone age has been impeded by the complexity of evaluating the wide variations in bone mineralization tempo, shape and size encompassed in the large number of ossification centers in the hand and wrist. Clearly, developing an accurate digital reference that integrates the quantitative morphological traits associated with the different degrees of skeletal maturation of 21 tubular bones in the hand and 8 carpal bones in the wrist is not an easy task.

In the development of this digital atlas, we circumvented the difficulties associated with the design of software that integrates all morphological parameters through the selection of an alternative approach: the creation of artificial, idealized, sex- and age-specific images of skeletal development. The models were generated through rigorous analyses of the maturation of each ossification center in the hands and wrists of healthy children, and the construction of virtual images that incorporate composites of the average development for each ossification center in each age group. This computer-generated set of images should serve as a practical alternative to the reference books currently available.