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A Healthy Future with AI  
**MEDIAI-BA**

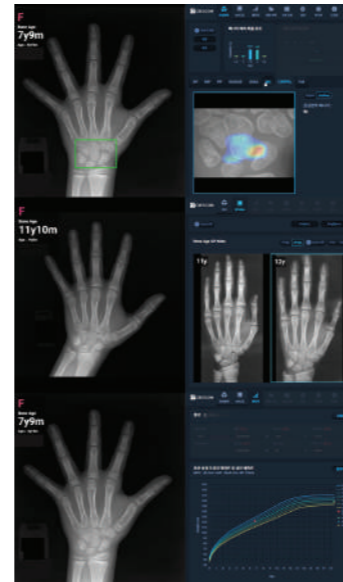
**TW3 and GP Hybride Bone Age  
Analysis Solution**

# MEDIAI-BA User Benefits



## Patent-based Accurate Analysis of Growth Status

- Hybrid bone age analysis solution with the integration of advantages of TW3 and GP.
  - Overcomes the ambiguity of the approximately one-year interval of the GP reference standard.
  - Overcomes the ambiguous bone maturation grade of 9 grades for each part of the TW3 technique.
- Accurate bone age and growth prediction analysis.
- Provides SMI(Skeletal Maturity Indicators) stage for timely determination of orthodontic treatment.



## More Efficient and Timely Analysis

- Fast reading around 5 seconds.
- Precise bone age results presented in units of one month.

## High Customer Satisfaction

- Provides accurate and easy-to-understand detailed growth analysis results and reports.
- Increases trust and satisfaction of parent and children.



Original Article | Musculoskeletal Imaging  
 KJR  
 Clinical Validation of a Deep Learning-Based Hybrid (Greulich-Pyle and Modified Tanner-Whitehouse) Method for Bone Age Assessment  
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**Objective:** To evaluate the accuracy and clinical efficacy of a hybrid Greulich-Pyle (GP) and modified Tanner-Whitehouse (TW) artificial intelligence (AI) model for bone age assessment.  
**Materials and Methods:** A deep learning-based model was trained on an open dataset of multiple ethnicities. A total of 102 hand radiographs (51 male and 51 female; mean age ± standard deviation = 10.95 ± 2.37 years) from a single institution were selected for external validation. Three human experts performed bone age assessments based on the GP atlas to develop a reference standard. Two study radiologists performed bone age assessments with and without AI model assistance in two separate sessions, for which the reading time was recorded. The performance of the AI software was assessed by comparing the mean absolute difference between the AI-calculated bone age and the reference standard. The reading time was compared between reading with and without AI using a paired t test. Furthermore, the reliability between the two study radiologists' bone age assessments was assessed using intraclass correlation coefficients (ICCs), and the results were compared between reading with and without AI.  
**Results:** The bone ages assessed by the experts and the AI model were not significantly different (11.39 ± 2.74 years and 11.25 ± 2.76 years, respectively, p = 0.31). The mean absolute difference was 0.39 years (95% confidence interval, 0.33-0.45 years) between the automated AI assessment and the reference standard. The mean reading time of the two study radiologists was reduced from 34.29 to 33.37 seconds with AI model assistance (p = 0.003). The ICC of the two study radiologists slightly increased with AI model assistance (from 0.945 to 0.990).  
**Conclusion:** The proposed AI model was accurate for assessing bone age. Furthermore, this model appeared to enhance the clinical efficacy by reducing the reading time and improving the inter-observer reliability.  
**Keywords:** Artificial intelligence; Convolutional neural network; Bone age assessment; Greulich-Pyle method; Tanner-Whitehouse method

## Clinically Proven Solution

- Europe, Malaysia and Korea medical device approved.
- Quality control certified (KGMP, ISO13485:2016).
- Leading innovation with patents and international journal papers.
- High satisfaction in clinical field.

Medical Device Approval	MFDS Class II	Malaysia MDA Class II
Model	MDAI-BA-01	
Operating Environment	Web Browsing available environment(optimized for Chrome and Edge)	
Bone Age Analysis Accuracy	The Mean Absolute Difference (MAD) between the AI result and the standard reference by specialists was 0.39 years(95% confidence interval, 0.33 - 0.45)	

# MEDIAI-BA Effect of using

## The average time for reading



According to a clinical trial of MEDIAI-BA, a bone age reading solution, when two reviewers refer to mediAI-BA, the reading rate is twice as fast, thus contributing to improved work efficiency.

## The mean absolute difference from reference standard



According to a clinical trial of MEDIAI-BA, a bone age reading solution, when less experienced doctors refer to mediAI-BA for reading, the absolute error is 0.32 years, which is twice more accurate than 0.88 years by single reading, thus markedly improving accuracy.



## GP Method

The GP method measures a child's bone age by referring to the standard atlas of left hand bones at intervals of about one year. This method allows doctors to read quickly. However, several studies show that different reviewers may focus on different growth plates, which creating deviations in reading.

## TW3 Method

The TW3 method determines the 9-step grade of thirteen parts of left hand bones and calculates the maturity score for bone age. In contrast to GP, TW3 exhibits less variation by holistic assessment of the major growth plate regions of the hand bones. However, TW3 takes longer time to obtain readings and nine ambiguous bone maturity classification may impair accuracy.

## Hybrid MEDIAI-BA

MEDIAI-BA achieved remarkable accuracy of bone age based on patent technology AI by making up for such limitations of both GP and TW3 and by integrating such advantages of both methods. It provides accurate and precise bone age analysis values on a monthly basis through integrated analysis of the entire hand area as well as the detailed bone maturity of major growth plate areas.