Chapter 21
Biometrically-Driven Orthodontic Treatment Using the Biocreative Orthodontic Strategy (BOS)

Seong-Hun Kim
Head of the Department of Orthodontics, Kyung-Hee University, South Korea

ABSTRACT

When determining the appropriate time for orthodontic treatment, a traditional clinical examination, a model evaluation, 2D and 3D radiographic assessments, and determining the relationship between the TMJ and masticatory muscles, are all necessary. This is especially true with patients who present with anatomic limitations, such as root resorption, alveolar bone loss, extremely thin alveolar bone around the teeth, an unstable mandibular position with TMD symptoms, and when there exists tripod collapse. The Biocreative Orthodontic Strategy (BOS) independently targets the moving of teeth, and/or the bone, or the soft tissues, using temporary skeletal anchorage devices, while avoiding unnecessary orthodontic appliances, to treat only the dental segments that will definitively benefit from orthodontic treatment. Often, this approach can be an effective solution for the complicated orthodontic patient. In addition to employing 2D or 3D cone beam computed tomography (CBCT), Biocreative orthodontics (BOS) focuses on finding actual problem occlusal contacts by combining T-Scan 10 computerized occlusal force analysis with electromyography (EMG), joint vibration analysis (JVA), and 3-dimensional jaw tracking (EGN), as well as performing a dynamic sleep analysis. This biometrically-driven orthodontic approach leads to an integrated diagnosis, a definite treatment plan, and ultimately to the orthodontic treatment itself. This methodology has been termed, "Multifactor Malocclusion Services (MMS)." This chapter will introduce Biocreative Orthodontics by describing its' key principles, treatment concepts, treatment effects, and then illustrating how innovatively it corrects complicated orthodontic cases with solely tooth movement (without orthognathic surgery), directed by an MMS biometrically-driven diagnosis.

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INTRODUCTION

The paradigm shift from 'treatment' to 'prevention' means shifting from treating acute disease to chronic disease management. If a malocclusion is not treated at the appropriate time, a patient can easily be exposed to various dental problems, including presenting compromised aesthetics and experiencing word pronunciation problems, both of which can negatively influence one's social life. To determine the appropriate start of orthodontic treatment, an accurate examination and analysis are required. Also, a multi-directional approach that addresses the malocclusion is required, involving a conventional static occlusion clinical examination, a model examination, and a detailed radiographic examination.

The Biocreative Orthodontic Strategy (BOS) developed by Prof. Kyu-Rhim Chung, analyzes dynamic data to isolate any factors that can cause a malocclusion to develop in patients (Chung, 2009). BOS considers ten key principles when making an orthodontic diagnosis, and for delivering tooth movement treatment in complicated patients.

- The **T Principle** is the **Tripod Support Principle and Targeted Approach** - a stable tripod structure between the incisors and the first molars is helpful with normal dentition growth and the eruption of the permanent teeth
- The **A Principle** is for **Airway**, which has become quite important in modern dental practice- The volume and activity of the airway should be considered at the beginning of establishing an orthodontic treatment plan.
- The **K Principle** is to **Keep an Eye on Growth** - a treatment plan should be established according to the expected growth potential of the patient.
- The **E Principle** is for **$E = mc^2$ =(Effect = Mechanics x Cooperation x^2)**, to ensure a successful treatment result will result with the:
    - Alveolar bone boundaries
    - Condylar therapeutic position
    - Targeting of tooth and bone movements
    - Importance of using as few Temporary Anchorage Devices (TAD) as is possible
    - Tongue posture
    - Avoidance of tooth-borne expander for rapid palatal expansion.

Together, these are known as the "**TAKE ACTION**" principles, which is an acronym of the combined principles (Figure 1).