

---

## Mandibular expansion using a biomimetic oral device

**Prof. G. Dave Singh\*, Dr. Hwasub Hwang, and Dr. Charin Hwang**

Adjunct Professor  
Stanford University  
USA



### **Abstract**

For clinical craniofacial development, the use of palatal expansion is widely recognized. Although it is viewed by many as the same procedure, it is a highly heterogeneous technique with many clinical variations, including surgical interventions. On the other hand, there is a paucity of studies that have investigated mandibular expansion. Mandibular expansion is critical for clinical success since changes in the palato-maxillary complex need to be coordinated with the mandible to permit optimal function. Until recently, it was thought that mandibular expansion cannot be achieved without surgical intervention. In this study, a 12-year-old boy visited Hwang Dental Clinic, and the parents requested non-surgical orthodontic treatment for an impacted lower canine tooth. After obtaining informed consent, a cone-beam (CB) CT scan was taken to localize the unerupted tooth. Next, a mandibular biomimetic oral appliance was designed, and the patient wore the device for 4-6 hrs. in the evening and while asleep at night. After approx. 18 months of active treatment, another CBCT scan was taken. It was found that the mandibular inter-premolar width in the axial plane increased from 28.8mm to 30.6mm, and from 28.4mm to 31.3mm in the coronal plane. Similarly, the intermolar width in the axial plane increased from 39.5mm to 40.4mm, and from 40.3mm to 42.8mm in the coronal plane. Moreover, successful eruption of the unerupted canine tooth was achieved without any surgical intervention or orthodontic brackets and wires. Although it could be argued that spontaneous eruption of the tooth would have occurred due to normal growth and development, clinical experience suggests that this is usually not the case for impacted teeth. Therefore, this preliminary study indicates that further applications of mandibular expansion using a biomimetic oral device ought to be investigated; for example, to prevent the impaction of lower third molars, and also as an alternative to mandibular advancement devices that are routinely used in cases of mild to moderate obstructive sleep apnea.

**Key words:** Biomimetic; Oral-Device; Expansion

### **Biography**

Professor G. Dave Singh is a US citizen who was born, educated and trained in England, UK. He holds three doctorates, including Doctor of Dental Medicine; a Ph.D. in craniofacial development, and a Doctorate in Orthodontics. Currently, he is Adjunct Professor in Sleep Medicine at Stanford University, USA; a member of the American Academy of Sleep Medicine, and the World Sleep Society; an Academic Fellow of the World Federation of Orthodontists, and Fellow of the International Association for Orthodontics. He was the 2019 recipient of the US Invisible Disabilities Association award, and in 2020, he was given a lifetime achievement award for his work on sleep apnea.