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## Allometry of the cranial base in prepubertal Korean subjects with Class III malocclusions: Finite element morphometry

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### ABSTRACT

Sphenoethmoidal allometry could be associated with ethnic heterogeneity of the midfacial profile. Thirteen cranial base landmarks were digitized from cephalographs of 69 Korean and 73 European American prepubertal children exhibiting Class III malocclusion. Average geometries were normalized, and a color-coded finite element (FEM) program was used to localize differences in morphology. ANOVA indicated that mean Korean and European American cranial base configurations differed statistically ( $p < 0.01$ ); this was also true for seven age groups tested ( $p < 0.001$ ). For size-change, FEM analysis revealed that in the anterior cranial base, Korean sphenoethmoidal and sella turcica regions were smaller ( $\approx 12\%$ ). Local increases in size were apparent for the posterior region of the Korean cranial base ( $\approx 35\%$ ). For shape-change, Korean and European American cranial base configurations were isotropic with minor anisotropy in the sphenoethmoidal and spheno-occipital regions. A sphenoethmoidal mechanism of midfacial retrognathism appears to be implicated in the development of a skeletal Class III morphology.

**KEY WORDS:** Cranial base, Cephalometric, Class III, Craniofacial, Korean, Finite element, Morphometry.

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