

A patterning cascade mode of tooth development has recently been proposed by the developmental genetic researches. Is the pattern of morphological variability among cusps consistent with the prediction based on this model that later-forming cusps are more variable than earlier ones? The present study explores pattern of morphological variability among cusps of human maxillary first molar (UM1) and second deciduous molar (um2), focusing on temporal order of cusp initiation and odontogenesis. Unworn specimens were μ CT-scanned, and 3D models were reconstructed. Size and shape variability were quantified using geometric morphometrics. Patterns of size variability in UM1 and um2 were almost in common. Later-forming cusps were more variable than earlier-forming ones in early phase of odontogenesis, which was consistent with the patterning cascade model. However, patterns of shape variability was not. UM1 represented high variability in earlier-forming cusps in later phase of development, and um2 represented high variability in later-forming cusps in earlier phase of development, and lingual cusps were more variable than buccal ones in later phase. The differences in developmental process between UM1 and um2, such as duration, the ratio, and relative timing of events, would not only correlate with morphological difference but also with distinct patterns of morphological variability.