

## Accepted Manuscript

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PII: S0940-9602(18)30107-9  
DOI: <https://doi.org/10.1016/j.aanat.2018.09.001>  
Reference: AANAT 51296

To appear in:

Received date: 8-6-2018  
Revised date: 19-7-2018  
Accepted date: 1-9-2018

Please cite this article as: Maeda, Yuuki, Miwa, Yoko, Sato, Iwao, Distribution of the neuropeptide calcitonin gene-related peptide- $\alpha$  of tooth germ during formation of the mouse mandible. *Annals of Anatomy* <https://doi.org/10.1016/j.aanat.2018.09.001>

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Distribution of the neuropeptide calcitonin gene-related peptide- $\alpha$  of tooth germ during formation of the mouse mandible

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## ABSTRACT

Calcitonin gene-related peptide- $\alpha$  (CGRP $\alpha$ ) is a neurotransmitter that is related to bone formation during development. However, CGRP expression is not well known to affect the formation of teeth during development. During tooth germ development, the relationships among CGRP $\alpha$ , calcitonin receptor-like receptor (CRLR), amelogenin (AMELX), dentin sialophosphoprotein (DSPP), osteopontin (OPN) and osteocalcin (OCN) are unclear despite various tooth and osteogenesis markers. Our real-time RT-PCR results showed that the expression levels of CGRP $\alpha$  mRNA gradually decreased, in contrast to the mRNA abundances of CRLR, AMELX, DSPP, OPN, and OCN, which rapidly increased from E14.5 to P1 in the mandible. In situ hybridization using an antisense probe for CGRP $\alpha$  mRNA showed significant localized expression levels around the tooth bud at E14.5 and epithelial cells near the dental ledge and outer and inner enamel epithelium at E17.5 compared to those at P1. The localization of the anti-CGRP $\alpha$  antibody reaction revealed a strong positive reaction at the surface layer of oral epithelial cells at E14.5 and oral epithelial cells of the dental lamina around the dental ledge depression in the mandible of E17.5 mice using immunohistochemical methods. The different anti-CGRP $\alpha$  reaction revealed its important roles during tooth formation at the postnatal stage. CGRP $\alpha$  mRNA was also detected in the interactions of tooth germ with the formation of odontoblast and ameloblast layers from dental papilla and inner enamel epithelium. CGRP $\alpha$  may also be related to tooth germ development. Furthermore, CGRP $\alpha$  is an important tooth and bone formation marker, and bone cells provide further evidence of a role in mandibular development in contrast to inflammatory systems.

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