

## PATTERNING OF TOOTH IN RODENTS

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**INTRODUCTION:** Ectodermal organs such as tooth, hair, mammary gland and feather share common morphological features, which develop from epithelial-mesenchymal interactions during the early stages of morphogenesis. The epithelial-mesenchymal interaction in tooth development has been widely studied with the recombination and reaggregation methods [1]. However, the roles of the epithelium and mesenchyme in the patterning of teeth have not been studied sufficiently. The patterning of an organ could be divided into macro- and micropatterning [2]. In this study, we divided the tooth patterning into the macropatterning and micropatterning. The macropatterning includes the tooth size and tooth number in maxilla or mandible, while the micropatterning of teeth includes the cusp size and cusp number in an individual tooth [3].

**METHODS:** Mice and rats, two species of rodents, show some dental similarities such as tooth number and cusp number, and differences such as tooth size and cusp size. In this study, we did recombination and reaggregation between mouse and rat tooth germs. The factors regulating the tooth patterning were investigated in the heterospecific recombinant teeth. The patterning of various recombinant teeth in the present study was discussed in terms of a reaction diffusion mechanism as previous studies on tooth patterning.

**RESULTS:** The mouse and rat dental epithelium forms the mouse cusp-sized cusp and the rat cusp-sized cusp respectively. The mouse and rat dental mesenchyme forms the mouse crown-sized crown and the rat crown-sized crown respectively. These results mean that tooth size and cusp size are determined by the mesenchyme and epithelium respectively. Furthermore, cusp number is co-regulated by the tooth size and cusp size. Additionally, tooth size is not affected by artificially changing dental mesenchymal cell number. On the other hand, the number of teeth is regulated by mesenchymal cell number.

### DISCUSSION & CONCLUSIONS:

Our results suggest that the tooth size and cusp size are determined by the dental mesenchyme and dental epithelium respectively and co-regulate cusp number by the epithelial – mesenchymal interactions. Tooth number as well as cusp number can be modeled as a reaction diffusion mechanism, in which the key molecules such as activators and inhibitors may determine the micropatterning and macropatterning of teeth. It is necessary to elucidate these key molecules in order to adjust tooth size and cusp size in the future bioengineered teeth.

### REFERENCES:

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