

MESENCHYME IS RESPONSIBLE FOR TOOTH SUPPRESSION IN THE MOUSE LOWER DIASTEMA

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INTRODUCTION: Diastema is a toothless gap () between the incisor and molars in mice. Diastema might contain vestigial tooth primordial, but diastemal buds disappear via apoptosis, whereas the molar buds develop into complete teeth during odontogenesis. The reason of tooth suppression in the mouse diastema is ambiguous. To reveal tooth regression in the mandibular diastema is attributed to epithelium or mesenchyme or both, the odontogenic capacity of the epithelium and mesenchyme of the lower diastema at E11.5 and E13.5 was investigated by heterotypic tissue recombinations and compared with that of the lower molar.

MATERIALS & METHODS: Five types of experimental tissue recombinations were prepared as follows: Recombinations = E11.5 diastemal epithelium + E10.5 second branchial mesenchyme; Recombinations = E11.5 diastemal mesenchyme + E10.5 first branchial epithelium; Recombinations = E13.5 diastemal epithelium + E13.5 molar mesenchyme; Recombinations = E13.5 diastemal mesenchyme + E10.5 second branchial epithelium; Recombinations = E13.5 diastemal mesenchyme + E10.5 first branchial epithelium. The epithelium and mesenchyme of the lower molar at E11.5 and E13.5 was used in parallel as controls.

The recombinants were cultured following the Trowell technique for 24 hours and then transplanted to kidney capsules of adult male mice. After subrenal culture for 2 weeks, the resulting tissues were harvested and processed with Azan dichromic staining for histological observation of tooth formation.

RESULTS: Teeth were formed in all types of the experimental recombinants except type . The percentages of tooth formation in the five types of experimental recombinants were 3/8, 4/9, 8/9, 0/9, 5/9, respectively. Meanwhile, teeth were developed in all kinds of the control recombinants. The percentages of tooth formation in the five types of control recombinants

were 4/5, 5/5, 8/9, 7/8, 4/5, respectively.

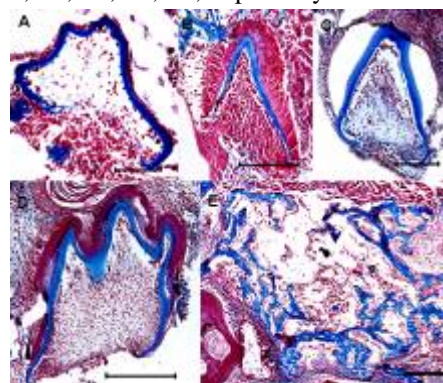


Figure. Recombinants of type (A), (B), (D), (C) yielded teeth and type (E) formed bone and keratinizing cysts without teeth. Scale bars: 100 μ m (A, B), 200 μ m (C-E).

DISCUSSION & CONCLUSIONS: Our results demonstrated that at E11.5, the lower diastemal epithelium and mesenchyme possessed the odontogenic potential and competence, respectively; at E13.5, both the lower diastemal mesenchyme and epithelium had odontogenic competence, while the lower diastemal mesenchyme did not possess odontogenic potential. Consequently, on the basis of comparison of the odontogenic capability between the diastemal and molar tooth primordia, our results support that E13.5 diastemal mesenchyme devoid of odontogenic potential is responsible for tooth suppression in the mouse lower diastema.

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