Abstract

The developing mouse dentition is a very useful tool to study molecular regulation of odontogenesis and also organogenesis. The embryonic mouse dentition comprises developing functional tooth primordia as well as rudimentary tooth primordia. These rudiments arrest their growth during development and either degenerate or become a part of a functional tooth.

Mice with gene defects also allow elucidation of a function of genes, their products and signalling pathways. The protein ectodysplasin is essential for development of ectodermal derivatives - skin, hair, glands and teeth. The Tabby mice have a mutation in the *Eda* gene, which encodes the protein ectodysplasin, and they display a number of dentition anomalies. Early development of the lower jaw dentition in Tabby embryos has been already morphologically described. As a prerequisite for understanding regulatory mechanisms of odontogenesis in Tabby mice, it is also necessary to map the spatiotemporal dynamics of signalling centres that express *Shh* in both the rudimentary and functional tooth primordia.

The aim of this thesis was to compare the signalling centres based on the *Shh* expression and its spatiotemporal dynamics in the lower jaw of Tabby and WT mouse embryos. Then the *Shh* data were correlated with known morphological data to clarify the role of rudimentary tooth primordia in development of functional teeth in Tabby mice, and thus also to contribute to elucidation of the role of the *Eda* gene in odontogenesis.

Using the methods of whole mount in situ hybridization, frozen sections and 3D reconstruction we found, that the *Shh* expression in the mandibular incisor area of Tabby embryos at early developmental stages does not yet belong to the functional incisor, but to the rudimentary (prelacteal) tooth primordium. This early expression was not affected in Tabby embryos. In contrast, the *Shh* expression at later stages, belonging to the functional incisor, was markedly reduced compared to the WT embryos. Contrary to the functional incisor, *Eda* gene is probably not essential for the development of the rudimentary incisor. However, it seems that *Eda* influences development of R2 premolar rudiment in the cheek region. Although the R2 bud was not morphologically detected in Tabby mouse mandible, we found the *Shh* expression there corresponding to the R2 place in WT embryos. However this expression in Tabby was delayed compared to WT embryos. It is therefore probable that R2 forms in Tabby, but the gene mutation causes its developmental delay, hypoplasia and malformation which result in the origin of the morphotypes of Tabby dentition.

Key words: tooth, mouse, *Eda*, Tabby, *Shh*, rudimentary tooth, early tooth development