

# Sutures, Growth Plates and the Craniofacial Base—Experimental Studies in the Toothless (*tl*-Osteopetrotic) Rat

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## Abstract

*The craniofacial skeleton develops from a base in which coordinated growth at sutures and growth centres assures the development of normal form. In this report we describe features of retarded postnatal craniofacial development in the osteopetrotic mutation, toothless (tl), in the rat in which bone growth in both the nasal area and the cranial base is reduced, suggesting that the mutation affects bone formation in sutures and growth plates. We began a systematic search for potential mechanisms by analysing the expression in time and intensity of RNA coding for collagens type I (Col I) and type III (Col III) analysed by in situ hybridisation of cells in the premaxillary-maxillary suture (PMMS). In the centre of the PMMS of tl rats, cells expressing Col I and Col III appeared later than in normal littermates and exhibited lower signal. During osteoblast recruitment from the suture centre into the bone domains, Col III RNA expression is switched off. Osteoblasts expressing Col I in abundance, but no Col III, appeared in the flanking bone regions of tl rats later than in normal littermates. It is proposed that the tl mutation restricts the number of available osteoblast progenitor cells, and that the shortage of these cells affects bone growth in the PMMS and in the cranial base. Additional analyses are needed to test this hypothesis and to understand the developmental dynamics in the cranial base.*

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