

1. Record Nr.	UNINA9911115548303321
Autore	Bernhard Ganss
Titolo	Enamel Research: Mechanisms and Characterization
Pubbl/distr/stampa	Frontiers Media SA, 2016
Descrizione fisica	1 online resource (130 p.)
Collana	Frontiers Research Topics
Soggetti	Physiology
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Sommario/riassunto	The rodent incisor is a good model system to study the molecular and cellular events that are involved in enamel biomineralization. Incisors in rodents continuously erupt during their lifespan, thus allowing the study of all stages of enamel synthesis, deposition, mineralization and maturation in the same tissue section. This model system has provided invaluable insight into the specifics of enamel formation as a basis to understand human pathologies such as amelogenesis imperfect. Furthermore, the rodent incisor allows exploration and understanding of some of the most fundamental mechanisms that govern biomineralization. Enamel is the most mineralized, hardest tissue in the body. It is formed within a unique organic matrix that, unlike other hard tissues such as bone and dentin, does not contain collagen. The formation of enamel can be divided into two main stages: the secretory and maturation stage. During the secretory stage, a highly ordered arrangement of hydroxyapatite crystals is formed under the influence of structural matrix proteins such as amelogenin, ameloblastin and enamelin. During the maturation stage, the organic matrix is removed and hydroxyapatite crystals expand to ultimately yield a functional hard structure consisting of over 96% mineral. Research efforts over the past decades have mainly focused on the secretory stage, providing novel insights into the concept of biomineralization. However, the events that occur during the maturation stage have not been yet explored in detail, likely because the physiological roles of the enamel-forming

ameloblasts are more diverse and complex at this stage. Mature ameloblasts are involved in the regulation of calcium transport in large amounts, phosphate and protein fragments in and out of the maturing enamel and provide regulatory mechanisms for the control of the pH. In recent years, increased efforts have been dedicated towards defining the molecular events during enamel maturation. The development of an ever-increasing number of transgenic animal models has clearly demonstrated the essential roles of matrix and non-matrix proteins during enamel formation. Multiple traditional and modern analytical techniques are applied for the characterization of enamel in these animals. The need for this Research Topic therefore stems from new information that has been generated on molecular events during the enamel maturation stage and the development and application of highly advanced analytical techniques to characterize dental enamel. The benefits and limitations of these techniques need to be reviewed and their application standardized for valid comparative studies.
